PROBLEMS OF FERTILITY
IN GENERAL PRACTICE

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BY

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Lately President R.C.O.G.



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AUTHORS' PREFACE

IN a work of multiple authorship in which the whole of the material has been discussed freely among contributors it is not always possible to assign responsibility for every word and phrase The following chapters, however, are the work of single individuals Chapter 2 is by Dr Joan Malleson, Chapters 3 and 4 by Mr Kenneth Walker, Chapter 5 (and Appendices 5 and 6) by Dr Margaret Jackson, Chapters 6, 7, 8 and 9 by Mr John Stallworthy, and Chapter 20 by Dr H Kalmus Chapter 10 is by Mr Kenneth Walker, Dr Jackson and the late Dr Maurice Newfield of Hamish Hamilton Medical Books To Dr Newfield the authors are also indebted for Chapters 15 and 21 and for general help in the preparation and production of the work

Much of the remaining material has been made available by the staff and committees—both medical and lay—of the Family Planning Association, to whom the authors are greatly indebted for a large store of authoritative information which is embodied in the text and appendices of the work

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The authors are particularly grateful to Sir Eardley Holland for his very helpful preface and his general interest in the work

March 1948

FOREWORD

BY

Sir Eardley Holland
M.D., F.R.C.S., F.R.C.P., F.R.C.O.G.
Formerly President R.C.O.G.

It was about the beginning of the century that man, in this country as in others, began seriously to consider how to adapt his reproductive pattern to his rapidly changing social and economic conditions. This need was felt in every class of society but the methods of family planning, both as regards the investigation and treatment of subfertility and the application of contraception, were at first more readily available to the rich than to the poor. It has always been my view that the use of the crudely narrow term "birth control"—with its implied restriction on fertility—was in large measure responsible for the opposition suffered by the pioneers, medical and lay, who strove to make the methods of family planning available to the people. The Family Planning Association, amongst whose friends and supporters is the team of experts who have written this book, has of recent years extended its activities to the establishment of clinics for subfertility and sexual difficulties as well as for contraception. Its policy is to press for the provision of public health services to deal with all these requirements of family life. This emphasizes the fact, perhaps insufficiently appreciated, that the prevention of conception is not an end in itself, but that, like the investigation and treatment of subfertility, it is a means to the end of making a family plan—in other words, of spacing births and relating size of family not only to social and economic needs but also to the health and happiness of parents and children alike.

In this book, as the table of contents shows, the subject is presented as a whole in one wide sweep, in which every part bears upon the rest. The first, and largest, part deals with the problem of infertile marriage, mainly from the point of view of the general practitioner. The diagnostic and therapeutic procedures described in this section do not all,

perhaps, fall within the scope of ordinary general practice, yet most practitioners could adopt some of them, the selection depending on their particular bent, and all practitioners should understand their purposes and the general principles underlying them well enough to know when they should be adopted for the patients in their care Similarly, although only a minority of practitioners could be expected to acquire the technique of seminal analysis discussed in this section and described in greater detail in a special appendix, *all practitioners should* be able to assess the relevant laboratory findings and use them as a guide to the next stage in investigation or treatment

The second part deals with clinical contraception, the problems of which, with the spread of contraceptive knowledge to all social groups, now inevitably arise in every class of medical practice The fact that many practitioners are seldom, if ever, asked for contraceptive advice betokens a most unsatisfactory relationship in this respect between the profession and the public The authors show in some detail, in their discussion of the manner in which the subject of contraception can be touched upon in everyday practice, how the individual doctor can play his part in remedying this state of affairs

The third part of the book deals with genetic problems, including the difficult subject of eugenic sterilization Human genetics are bound to intrude more and more into the field of preventive medicine, and when the question arises whether, on genetical grounds, a given couple should have children, the doctor will have to bear an increasing share in the responsibility for the ultimate decision

The work comes to an end in a series of appendices which should prove of great use to busy practitioners I may perhaps draw attention to the lucid directions to patients on the keeping of cyclical temperature records, and to *the appendix, for laboratory-minded practitioners,* on special diagnostic methods used in the investigation of subfertility

This brief survey indicates the comprehensive view the authors have taken of their subject Indeed, by its very scope their book, the first of its kind, will, I believe, do much to place an important branch of social medicine in its right perspective The text, though directed in the first place to doctors in general practice, cannot fail to be helpful to a wider public, both medical and lay For doctors will find in it much to extend the scope and interest of their practice,

and others will be stimulated by it to a deeper understanding of the part played by fertility problems in the life of the individual and of society

EARDLEY HOLLAND

TABLE OF CONTENTS

Appendices

LIST OF ILLUSTRATIONS

PART ONE

THE INVESTIGATION AND TREATMENT OF STERILITY

PROBLEMS OF FERTILITY IN GENERAL PRACTICE

CHAPTER ONE

STATEMENT OF THE PROBLEM

Prevalence of Childless Marriage

Some years ago an experienced gynæcologist gave it as his opinion that roughly 10 per cent of marriages were sterile. Since then his statement has been so often repeated, and to the uncritical eye each repetition has looked so like an independent confirmation, that what was originally one man's assessment has gradually acquired the status of an authoritative pronouncement. In fact there is very little known, in statistical terms, about the prevalence of involuntary childlessness in Britain, and the figures suggested for other countries appear to be equally undependable.

The 1911 census of England and Wales showed that among women who were married between the ages of twenty and twenty-four, and whose marriage on the day of the census had lasted ten years or longer, total childlessness amounted to 5.8 per cent. Unfortunately we have no comparable figures for its prevalence to-day, but it is significant that the Royal Commission on Population, in its White Paper published in 1945, stated that there was no evidence that the fall in the average size of the family was due to biological factors or to any increase in the physiological causes of sterility.

Responsibility of the Doctor

It is reasonable to inquire, if sterility is not on the increase, why in recent years its problems should have played such a large and manifestly growing part in medical practice. Involuntary childlessness is no more distressing to-day than it has been throughout the ages, yet the demand for its treatment has become greater than ever before. A part of the explanation no doubt may be found in the change that has occurred in the intellectual climate

of society. People are less inclined than heretofore to look upon their misfortunes as a sad destiny which they must accept with fortitude but cannot attempt to influence by their actions. The main reason, however, lies in the fact, of which the public is becoming increasingly aware, that knowledge of the subject is rapidly advancing, that the methods of investigation and treatment now available offer a real chance, in a high proportion of cases, of elucidating and removing the underlying cause or causes of the infertility, in short, that there is now some point in consulting a doctor whereas in former years there probably was not.

This public enlightenment is due in large measure to the considerable body of popular literature now available on problems of fertility. The literature, naturally enough, is of unequal value, yet in practice it is found that many of the couples who come for advice and treatment bring with them a fair knowledge of the nature of the problems which confront the physician as well as a searching curiosity about both fundamentals and details which it is his duty to satisfy. Admittedly a busy general practice does not easily provide leisure for such exchanges between patient and doctor, nevertheless, the patient's questions should normally be taken seriously and answered in clear and simple terms. It should be borne in mind that the diagnosis in difficult cases may call for a series of investigations, sometimes costly, and involving both partners of the marriage, and that the treatment following the investigations may be lengthy and irksome, again possibly to both partners. Their co-operation in all stages will be more readily secured if they can be made to feel themselves to be collaborators with the doctor in an enterprise upon whose nature, objectives and chances of success they are at liberty to seek all the information they may desire.

The following chapters discuss the investigation and treatment of infertility, in the male and female, mainly from the point of view of general medical practice, but they also deal with procedures, more highly technical, on which the general practitioner would normally seek specialist advice. It must be admitted that opportunities for expert assistance are more easily available in London and other large centres than in country districts, but there are good reasons to hope that before long many provincial hospitals will offer fertility services and that this development will involve an ever greater number of hospitals as the demand for treatment becomes more widely spread.

Relation between Investigation and Treatment

In practice it is found, as will be shown in detail later, that the investigation of sterility is in some cases followed by "cure", and in some cases by the discovery that the couple is in fact not infertile Not infrequently, moreover, "sterility" appears to resolve spontaneously, an event which may explain the apparent success of many forms of treatment which appear to be wholly lacking in scientific foundation It is thus clear that no couple should be regarded as sterile or subfertile until the condition has been established by investigations, complete by present-day standards and embracing both partners, and it is worth adding that on such searching investigations the diagnosis of complete sterility is very rare Equally important is the fact that the mere discovery of a healthy pelvis in the wife, or of motile sperms in the husband's semen should not in itself be regarded as evidence of fertility

When to Investigate

Before discussing the details of technique it is cogent to ask how long should marital relations have been established before a couple seeking advice on their fertility may justifiably be subjected to the necessary investigations? Matthews Duncan enunciated the rule that a woman should not be regarded as sterile within four years of marriage and many workers have adopted this as a reasonable estimate According to Meaker, ' the greatest gain will accrue if it be considered that one year's involuntary sterility calls for the best possible diagnostic work Perhaps a compromise between these views may be held reasonable for most couples

The matter may be stated in even more exact terms The average interval between the institution of complete marital relations and conception has been estimated at about four months This figure relates to couples living a regular married life, not those separated from each other for long periods at a time Since many women become pregnant in the first month, it follows that a delay of eight to twelve months need cause no real concern, and indeed, unless special considerations are present, such as advanced age or the imminent departure of the husband overseas, there are no good reasons for initiating investigation until at least eighteen months of ' sterility have elapsed

This point is particularly important in view of the distress with which some patients view even a slight delay

of society. People are less inclined than heretofore to look upon their misfortunes as a sad destiny which they must accept with fortitude but cannot attempt to influence by their actions. The main reason, however, lies in the fact, of which the public is becoming increasingly aware, that knowledge of the subject is rapidly advancing, that the methods of investigation and treatment now available offer a real chance, in a high proportion of cases, of elucidating and removing the underlying cause or causes of the infertility, in short, that there is now some point in consulting a doctor whereas in former years there probably was not.

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(5) Are the sperms and the ovum free to meet? "Non patency" of the tubes is found in about one fifth of all cases of sterility, sometimes due to spasm but sometimes to genuine mechanical block

(6) Is the woman, whether menstruating or not, actually producing ova? Many women experience occasional anovulatory cycles

(7) Assuming that the ovum is fertilized, are the local conditions suitable for its early embedding? Does the endocrine balance favour the maintenance of pregnancy? Is early habitual abortion taking place?

As investigations proceed, most cases will give a clue of some sort under one or more of these heads All authorities agree that in a large proportion of cases subfertility factors are present in both partners A combination of factors, *some of them variable and transient, are perhaps more* often found than any one clearly defined and permanent lesion

Even where a serious lesion is found, the practitioner should be cautious in giving a totally unfavourable prognosis It is true that such conditions as tuberculosis of the female generative tract, certain cases of complete azoospermia, etc, have not at present proved responsive to medical treatment, yet there is always the possibility that improved therapeutic technique may offer more favourable prospects

in establishing pregnancy. Such women, often the anxious and well-read type, are liable to press the practitioner into premature and over-elaborate investigations and treatment and it is well that they should feel that his tardiness and restraint are dictated by sound judgement. Usually it is not difficult to persuade them to accept their alarm as irrational, but they will do so all the more readily and with real gratitude if the physician shows tolerance and understanding of their feelings.

The First Consultation

At the first consultation it is well to make sure that the patient is in good general health and fit to undertake pregnancy. A pelvic examination should be carried out and a brief explanation given of the elementary facts concerning conception. It should be pointed out that fairly frequent intercourse is favourable, and where this does not occur special advice should be given about the choice of dates for coitus (see page 8). At the same time any coital difficulty which may interfere with full penetration should be attended to (see Chapter 2). Should the patient demand more active measures, she may be instructed in the method of plotting a temperature chart for the purpose of determining her precise ovulation time (see Chapter 7) and in the technique of pre-coital alkaline douching (see Chapter 5).

The Full Investigation

In cases which warrant serious investigation but in which neither the history nor the general clinical examination suggests any definite lesion, it is convenient to think of the problems as falling under the following headings:

(1) Does coitus occur frequently enough to offer a reasonable chance of conception? Many cases of 'sterility' are in fact traceable to inadequate opportunity.

(2) Is it certain that the semen is deposited close enough to the cervix? Deposition at a distance of one or two inches may, in some cases, be a subfertility factor.

(3) Are the sperms of good quantity and quality? Are they sufficiently viable *in vitro*? Severe seminal deficiency may be expected in about one-sixth of cases, and in about one-third of cases slighter seminal deficiencies are found to contribute to the delay in achieving pregnancy.

(4) Is the cervical mucus adequate in quality and

quantity for the easy passage of the sperms from the vagina to the uterine cavity? Do these sperms survive well in it?

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CHAPTER TWO

COITAL PROBLEMS

BEFORE any couple can be seriously suspected of sterility, it is necessary to ascertain whether coitus has occurred at suitable times for conception and whether the semen is in fact being deposited at the cervical os or within reasonable distance of it Such considerations might appear obvious, yet they are only too frequently overlooked, particularly in hospital departments where lack of privacy renders difficult the discussion of personal matters Not infrequently patients are subjected to varied investigations and not until the 'post coital test" is consistently negative does inquiry reveal that there has been no real chance for conception to occur

Timing and Frequency of Coitus

If it were possible to determine the exact moment of ovulation, one single act of coitus in any month should be sufficient to effect conception It is known that insemination must precede or follow ovulation within a very few hours if conception is to be achieved But although knowledge of ovulatory processes has advanced greatly (see Chapter 7), it is still not easy to predict the precise date of ovulation in any given case This would be possible only *if all menstrual cycles were of the same length, if ovulation* always occurred in the same relation to the onset of men struation, and if indeed an ovum were formed unfailingly in every menstrual cycle These conditions are not fulfilled, however, nor is it known for how many hours the ovum remains fertilizable or the sperm capable of effecting fertilization

Thus, in the present state of knowledge couples who wish to time their coitus correctly cannot expect guidance except in general terms They should be told that ovulation usually occurs about fourteen days before the onset of the next period and that they would do well to attempt intercourse at least once or twice during the probable ovulatory week, but in offering this advice too much emphasis should not be laid upon "timing , for sensitive people are natur-

ally fretted, and some men are reduced to temporary impotence (see page 20) by pressure of this sort Moreover, it should be recalled that, according to some authorities, coitus at other times is not necessarily infertile Dickinson (1938) has assembled from the literature an impressive number of cases in which conception appears to have resulted from isolated acts of coitus at all phases of the cycle, even the menstrual days themselves This evidence has indeed been called into question as being mainly, if not entirely, anecdotal, and on physiological grounds alone the chances of conception on days far removed from those on which ovulation would normally occur must be regarded as excessively small But the fact that there are still differences of opinion on the matter is worth recording, if only as a warning against too rigid recommendations on the timing of sexual intercourse

Nevertheless, intelligent couples—by the aid of temperature records such as those discussed on page 81 or, where they are present, of such symptoms of ovulation as *Mittelschmerz* or "spotting"—can and do attempt to relate their coitus to the hours of ovulation, and the adoption of this practice undoubtedly affords a remedy in a certain number of barren matings, namely those in which precise timing is rendered vital by unduly poor viability of the sperm or the ovum Women who surprise themselves by achieving a first conception after many years of marriage cannot usually be classed as those with faults of reception or with faults in the mechanics of the tubes Many such pregnancies must be due to the chance meeting of ovum and sperm which have previously missed one another owing to an exceptionally short lease of life The fact that such cases occur not infrequently should always be pointed out to couples whose investigations have shown no total bar to conception

As a practical measure it is very helpful for the wife to keep a calendar to show the relation between acts of coitus and the menstrual periods A "year at a glance" type should be chosen and the practitioner should instruct the woman to draw a line through the menstrual days and to put a cross on the days when intercourse has occurred Such a calendar is valuable both as a guide to "timing" and as an indication of how far failure may be due to mistiming

It is worth noting that women with short cycles who ovulate in every cycle have more opportunities for con-

ception than those with longer cycles and correspondingly fewer ovulations But when cycles are very short and the menstrual flow is prolonged, there sometimes arises a special problem of timing For if this flow overlaps the next ovulation—i e if it is still proceeding some fourteen days before the next period is due—the optimal date for fruitful intercourse may be missed In such circumstances the woman should be instructed to douche gently with warm water and resume coitus earlier than usual A similar problem is occasionally met with among orthodox Jewesses who remain childless as long as the ritual post-menstrual bath (which must precede the resumption of coitus) is regularly delayed beyond the ovulatory phase—as in short cycles it so easily may be, but conceive immediately this traditional observance is relaxed

Inadequate Insemination

Inadequate insemination is a very common contributory factor in delayed pregnancy Although in highly fertile couples the sperms may be vigorous enough to effect con ception even if deposited only at the vaginal introitus, in others, less fertile, their deposition two or three inches from the cervical os may make all the difference to the chances of insemination The acidity of the vagina is known to be detrimental to sperms, many of which, in any case, have a poor expectation of survival even in the favourable environment of the cervical mucus plug (see page 45) If, then, there is any doubt about the mechanical adequacy of coitus, a post coital examination should be made soon after sexual intercourse (see page 33 and Chapter 5)

Mechanical Reasons for Inadequate Insemination

When it is found, as it is in some cases, that coitus is incomplete, infrequent, or even avoided altogether because it is painful to the wife, the explanation may lie in undue rigidity of the hymen If this condition is present the patient should be shown how to stretch the hymen either digitally or with graduated dilators This simple treatment will usually suffice, but where it does not the hymen may be eased or incised under anæsthesia, a well administered gas being adequate in most cases Occasionally an abnormally small rigid vagina is found in association with hypoplastic genitalia and in this condition improvement can usually be obtained by suitable endocrine therapy (see page 61) In all cases of dyspareunia attention must of

course be given to lesions of surrounding structures Mechanical difficulties in the husband, such as phimosis or hypospadias, may also call for treatment

Insemination is occasionally inadequate owing to the cervix being atypically placed Although theoretically this should not bar conception, it probably lessens the chance in cases in which the viability of the sperms is poor This possibility arises when the position of the cervix is such that it cannot be reached by the penis in the usual coital attitude In many cases the cervix will become much more accessible if the knees are drawn upwards and outwards to the shoulders, in others, a change to coitus *a tergo*—that is, to the normal mammalian position—is sometimes recommended as a means of ensuring the deposition of sperms in the neighbourhood of the external os The value of these expedients can, in any given case, be assessed by a post coital test

Functional Reasons for Inadequate Insemination

It is particularly important, in the investigation of sub fertility, to ascertain whether coitus is in fact genuinely established Among patients of all classes there are a surprising number so inhibited sexually and therefore so ignorant of ordinary sexual matters as to be actually unaware of what constitutes a normal sexual union Some 5 per cent of patients who seek advice for primary sterility have probably never consummated their marriage at all Stallworthy, in a series of 581 hospital and private patients with primary sterility, found an intact hymen in 5 per cent For a similar series of 397 private patients, Green-Armytage gives a figure of 4 per cent These somewhat startling findings afford ample proof of the need for proper premarital sex education and indeed for readily available sexual advice and guidance on problems that arise during marriage

Many women who have assured the physician that inter course is regular and satisfactory will nevertheless be found, on examination, to have an intact hymen Some women, on the other hand, confuse themselves and the physician by stating that intercourse is "not right ' or ' all wrong", when all they wish to imply is that they do not themselves attain a satisfactory orgasm Absence of orgasm in the wife has in fact very little, if any, bearing on the chances of conception, and where a case history appears to suggest the contrary and the woman states definitely that con-

ception than those with longer cycles and correspondingly fewer ovulations But when cycles are very short and the menstrual flow is prolonged, there sometimes arises a special problem of timing For if this flow overlaps the next ovulation—i e if it is still proceeding some fourteen days before the next period is due—*the optimal date for fruitful* intercourse may be missed In such circumstances the woman should be instructed to douche gently with warm water and resume coitus earlier than usual A similar problem is occasionally met with among orthodox Jewesses who remain childless as long as the ritual post menstrual bath (which must precede the resumption of coitus) is regularly delayed beyond the ovulatory phase—as in short cycles it so easily may be, but conceive immediately this traditional observance is relaxed

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Insemination is occasionally inadequate owing to the cervix being atypically placed Although theoretically this should not bar conception, it probably lessens the chance in cases in which the viability of the sperms is poor This possibility arises when the position of the cervix is such that it cannot be reached by the penis in the usual coital attitude In many cases the cervix will become much more accessible if the knees are drawn upwards and outwards to the shoulders, in others, a change to coitus *a tergo*—that is, to the normal mammalian position—is sometimes recommended as a means of ensuring the deposition of sperms in the neighbourhood of the external os The value of these expedients can, in any given case, be assessed by a post-coital test

Functional Reasons for Inadequate Insemination

It is particularly important, in the investigation of sub fertility, to ascertain whether coitus is in fact genuinely established Among patients of all classes there are a surprising number so inhibited sexually and therefore so ignorant of ordinary sexual matters as to be actually unaware of what constitutes a normal sexual union Some 5 per cent of patients who seek advice for primary sterility have probably never consummated their marriage at all Stallworthy, in a series of 581 hospital and private patients with primary sterility, found an intact hymen in 5 per cent For a similar series of 397 private patients, Green Armytage gives a figure of 4 per cent These somewhat startling findings afford ample proof of the need for proper premarital sex education and indeed for readily available sexual advice and guidance on problems that arise during marriage

Many women who have assured the physician that inter course is regular and satisfactory will nevertheless be found, on examination, to have an intact hymen Some women, on the other hand, confuse themselves and the physician by stating that intercourse is ' not right or "all wrong ', when all they wish to imply is that they do not themselves attain a satisfactory orgasm Absence of orgasm in the wife has in fact very little, if any, bearing on the chances of conception, and where a case history appears to suggest the contrary and the woman states definitely that con-

ception occurred on the one and only occasion on which she achieved a full orgasm, it will be generally found that this was also *the first occasion on which full penetration* took place

Particular allowance must be made for the fact that patients with sexual disabilities are sometimes too inhibited to appreciate their existence Still more often, perhaps, they are too confused to be able to speak of the difficulties which they vaguely sense It is not indeed surprising that a woman who has never even learned words in which to describe the sexual act or has never experienced normal coitus, fails before the task of explaining to the physician that, for instance, her husband's ejaculation is too precipitate for the semen to reach beyond the vaginal entrance, or that he does not maintain his erection well enough to achieve satisfactory penetration, or that she herself has too tough a hymen or too tight a spasm to permit such penetration to occur Yet such disorders, even if they are not total and absolute, may go far to reduce the chances of conception Thus it is clear that a careful history which, by well chosen questions, will reveal any possible sexual difficulties, is an essential part of the inquiry in cases of subfertility, and in questioning, the practitioner should make sure that he offers the patient suitable terms in which to describe any impediment that may be present

Although, for instance, an uneducated woman may require questioning in very simple words, most difficulties can be eliminated rapidly by such questions as the following "How often would you be likely to have intercourse in a week?" "Is it satisfactory for both of you?" "Do you get any pain?" If so, "Are you too tight—too dry—to let *him in?*" "*Does he get deeply in the passage?*" If not, "Does the seed come too quickly, before he can get in?" or "Does he keep his stiffness long enough to get inside?" *Although these expressions can* and should be worded differently for more educated women, such questions—provided they are simple enough for a nervous patient to understand—will seldom, if ever, be resented

Where such functional difficulties and disorders are found to exist, it is best if the practitioner can himself advise about their management, but if he feels unable or unwilling to do so he should not hesitate to refer the case at once to a gynæcologist or medical psychologist If the disorder has persisted for some months, it is not likely to resolve without further help, and such help may be needed

by both partners, for the difficulties are not uncommonly present in both, if only because "anxiety" states are somewhat infectious, each partner adding to the difficulties of the other For convenience, however, the commonest disorders will be considered separately

Functional Disorders Experienced by the Wife

By far the most important of these is the habit of contracting the vagina—to a greater or lesser degree—so that the penis fails to penetrate fully and causes inevitable discomfort in the attempt Any woman who is nervous (or who has to protect a painful lesion of the genital tract) is liable to arch the lumbar spine automatically and thus to tighten the vaginal introitus These symptoms do not constitute true "vaginismus', which is a definite neurosis and is manifested by a muscular spasm sometimes experienced in the full length of the vagina and often in the general skeletal muscles as a whole

There is no doubt that most cases of vaginal contraction are overlooked if patients are examined in the Sims position—the slight flexion of the spine and thighs being usually sufficient to obviate the spasm It is only severe vaginismus which will, in this position, manifest itself by a sudden contraction and lordosis For the investigation, therefore, the patient should always be examined lying on the back, for in this position it is possible to observe minor degrees of flinching and to ensure their correction by deliberate flexion of the lumbar spine A suitable coverlet can be maintained throughout the examination

In cases of true vaginismus any attempt at examination will produce arching of the back, strong adduction of the thighs, and a contraction of the vaginal musculature of such strength as sometimes to provoke great pain When the spasm is extreme, even one examining finger may fail to be admitted

This syndrome is entirely psychogenic and fortunately most cases yield to explanation and persuasion The first step in treatment is to ask the patient to bend and abduct the left knee it is not wise to expect too much flexion, at first Then the examining finger, well lubricated, should be slowly inserted, pressure being directed towards the urethra rather than to the perineum When this has entered, the patient must be persuaded to flex and abduct the other knee also, later in the examination, it may be necessary for her to draw both knees upwards and out

wards towards the shoulders In nearly every case there will be such a marked lessening of spasm that the patient herself is quickly impressed by the easing of her discomfort During this manipulation the tip of a second finger should be inserted also Occasionally a vaginal dilator may be preferable, but is usually best reserved for the patient's own use After the first examination has been made, she can be encouraged to attempt the manipulation herself with a lubricated dilator This will help her to find for herself which postural changes bring the most relief and therefore which attitude will be the best for her to adopt during coitus Often it is helpful to correct the lordosis of the lumbar spine by getting the patient to draw the pubis slightly upwards—those who cannot do so may be shown how to lie with a firm pad behind the sacrum, but yet others remain unrelaxed until the spine is completely flexed by drawing the knees fully upwards and outwards towards the shoulders

Bearing in mind that the syndrome is a defence against penetration, it is not surprising that many patients find difficulty at first in adopting and maintaining a relaxed attitude Nevertheless, by persuasion and patience the vast majority can be helped to overcome their spasm For a severe case, two or three interviews are generally necessary Although each examination should be conducted gently it is essential that the examiner is firm, and insists on some progress being made on each occasion Women with vaginismus really require an outside authority to help them overcome unconscious dreads, and the examiner (or indeed the husband) who is afraid to use authority will usually fail to be of any assistance Those patients who still have an intact hymen will be helped by the use of vaginal dilators with which to practise stretching and relaxation at home None are helped by being frightened or hurt by the physician's attempts at stretching If a genuinely rigid hymen is present *it is best stretched or broken manually under anæsthesia* Packing should be avoided, and it should be the patient herself who subsequently inserts well lubricated dilators If she fully flexes her knees and hips this procedure need cause little pain

Certain cases of vaginismus also exhibit a hysterical hyperæsthesia which can even spread to the external genitalia and thighs Patients with such symptoms frequently require more persuasion than the average and those who eventually require psychotherapy are generally found in this group

Vaginismus is by no means a disorder of frigid women Sometimes the vagina may be anæsthetic to sexual feeling yet hyperæsthetic to stretching or to touch, but sometimes vaginal desire is so urgent that the frustration caused by unsuccessful penetration results in a severe anxiety neurosis In general it may be said that the prognosis is particularly good in these latter cases, for here there is a real incentive for the patient to relax her spasm

Severe vaginismus is commonest in women who have been "conditioned" in infancy to expect pain from external manipulation The use of soap sticks, enemata, or painful treatment for threadworms will be found to figure in most of the case histories In a minority the syndrome proves on analysis to be an expression of unconscious fear, sometimes of childbearing, sometimes of being hurt by the penis, sometimes even of having the personality disturbed or dominated by an outside influence Cases which do not yield to persuasion after a few interviews should, where possible, be referred for psychotherapy, but some may require prolonged psycho analysis for their resolution If this is impracticable the question of surgical assistance will occasionally arise, but only a very small minority, possibly one in two or three hundred, should need such treatment Although severing the muscle fibres can prevent spasm, the aversion to coitus is not really lessened by such means [1]

It is noteworthy that when a marriage is annulled on account of vaginismus, the law does not insist on treatment by either psychological or surgical measures Doubtless the omission dates from a time when such forms of treatment were not available, yet the law appears to accept what is a fact, that although the affected woman may become normal at some future date, the established habit with this particular husband is not likely to resolve

The practitioner called upon to advise in a case of unconsummated marriage should make careful and accurate notes of the history and of the condition of the hymen, particularly if he recommends treatment by dilatation The fact that a hymen is eased or absent or even that pregnancy has occurred, is not in itself a reason for rejection in a petition for annulment The law takes account of the fact that although severe vaginismus appears most commonly in reaction to the first attempts at coitus, it can

[1] For a full account of the management of such cases see Holland Eardley on Dyspareunia in the *British Encyclopædia of Medical Practice* Butterworth 1937 and Malleson Joan on Vaginismus its Ætiology and Treatment *British Medical Journal* 1942 ii 213

sometimes occur on a second marriage, and even in a multiparous woman

Most women with neurotic sexual difficulties fail to lubricate naturally during coitus, and in the treatment of dyspareunia no single measure is so valuable as the prescription of a non greasy lubricant to replace the commonly employed Vaseline Suitable preparations are all proprietary (page 229), Prentif Lubricating Jelly being one of the best It is practically non-spermicidal The free application of this to the lower third of the vagina coupled with full flexion of the knees and hips, will do much to make the act of coitus less uncomfortable and ultimately more acceptable

It is not necessary here to describe frigidity, the highly common functional disorder in which there is partial or total absence of the characteristic sexual sensation in the vagina or clitoris or both The female genital tract appears to be by far the most ' hysterical" organ of the body, being subject throughout its length to anæsthesias, hyperæsthesias, paræsthesias, hypertonus and hypotonus, and hyper- and hypo-secretion It seems certain that in civilized women its responsiveness is liable to be obscured by anxieties, conflicts fixations, repressions and inhibitions, which can manifest themselves in an endless diversity of symptoms It is enough to say that although frigidity may impair the happiness of the woman or of the marriage it does not fortunately, unlike some functional disorders of the male, interfere with the chances of conception *Lubrication* should of course be advised when necessary, and it is well to assure the patient that her chances of conception are not impaired The common belief that some genital feeling is necessary for conception sometimes causes additional and needless suffering

Functional Difficulties Experienced by the Husband

The most common types of male disability are precipitancy, relative disinclination to coitus, and impotence Although men with such difficulties may sometimes be found to have a poor sperm count, the association appears to be fortuitous, and in fact there is little relationship between deficiencies of potency and the impairment of fertility The disturbances themselves are not sharply defined clinical entities, but are often combined or interchangeable They are so widespread that most normal men have experienced them at some time or another It is only

when they are persistent that medical advice may be necessary

Although the disabilities are mainly psychogenic, and indeed may appear in relation to one woman yet not another, nevertheless they may be found in association with local genital disorders which should naturally receive appropriate treatment Therapeutic measures which relieve anxiety are always valuable, and a careful local examination by a genito urinary specialist is often in itself of the utmost benefit Most men with these disorders prefer to believe that their origin is "physical" and not "nervous", and accordingly medical treatment by tonics etc often brings greater reassurance, even to perfectly healthy men, than any persuasive measures, and should not, therefore, in suitable cases be withheld

Of the male disorders, precipitancy is certainly the commonest The most normal men are liable to ejaculate prematurely at the beginning of marriage, or after long periods of abstinence, but in others, who suffer permanently from the disability, it must be usually classed as a symptom of sexual neurosis It is understandable that disappointment about past failures can, by increasing anxiety, thereby increase precipitancy in a most distressing way Nevertheless, with reassurance and practice, many men who are precipitate can achieve some measure of control, and even if the sexual satisfaction of both partners remains incomplete, there is every chance of conception if the erection is sustained long enough to achieve penetration

In these cases the husband should be instructed to allow stimulation to occur slowly, and if he feels ejaculation to be imminent, to pause in his movement and concentrate attention solely upon control It is also important that the wife should adopt a position that facilitates the husband's rapid approach The vaginal introitus should be lubricated if necessary and relaxed by separation of the knees and flexion of the lumbar spine The couple should be reminded that repetition of coitus as soon as possible is likely to prove satisfactory

Premature ejaculation is more often than not psychogenic, and severe cases will sometimes require psychotherapy An effort is often made to treat cases along physical lines Walker (1948) suggests that exercises of the perineal muscles and the sphincters are advantageous The patient is instructed to stop the stream of urine intermittently during micturition, and if this is done deliberately

and consciously he gains confidence in himself and begins to exercise some control during coitus Walker also finds that it is sometimes useful to reduce the sensitivity of the glans penis, before coitus, by applying a 3 per cent percaine solution or a 1 per cent cocaine ointment Bromides and Bellergal may also have a favourable effect In a small minority of cases, division of a tight frenum or the passage of bougies has been held to help

Faults in achieving or maintaining erection are often more difficult to manage It is not easy for the general practitioner to influence deeply unconscious reactions or to undo the effects of early childhood training Infantile anxieties or fears, parental fixations, and many complex hindrances in emotional development may unfavourably influence adult potency An affectionate and uninhibited wife can sometimes do much to help, but only too often anxious and neurotic men seem to choose similar types for their partners In any case, the husband's assertion that the disability is entirely on his side should not be accepted without question, for very often his difficulties are increased by his wife's unhelpfulness, whether in coital position or in tension of the vaginal introitus Such men often gain much in confidence on being assured that their difficulties have been partly external or "real" and not entirely self engendered Indeed, in the treatment of such sexual difficulties as well as of disorders of fertility, it is almost invariably helpful to the couple to free the husband as far as possible from responsibility Most women prefer infinitely to feel that whatever disability there may be comes from their own side, and it is only too easy to increase the problems and disappointments still further by comments which decry their husband's competence

If impotence occurs early in marriage the outlook is not unfavourable, for the ordinary burden of "sexual anxiety" carried by all civilized people is much enhanced by inexperience The husband should be assured that most men at some time or other have had occasional failures, and the wife should be instructed to show neither disappointment nor dismay An attitude of easy acceptance on her part will often do much to overcome the difficulty But when the symptom is of long standing, and habitual, the outlook is less good and the help of a medical psychologist should undoubtedly be sought Such patients suffer usually with coincident depression and may be more inclined to undertake treatment for this than for the sexual disability itself

Various treatments for impotence have been attempted since time immemorial It is outside the scope of this book to give a detailed account of recent measures (see Walker, K and Strauss, E B, 1948, Loewenstein, J, 1947) Some cases are found to have libido increased by small doses of methyl testosterone by mouth But there are hazards in using this preparation too freely, for large doses used over several weeks have been known to depress spermatogenesis seriously in some men For impotence 5 to 10 mg daily can be given for a month, alternatively 10 mg twice daily can be given during the wife s ovulatory week Loewenstein has advocated the use of a mechanical support to assist a poor erection, and this may sometimes help when other remedies have failed

When impotence does not respond to treatment artificial insemination with the husband's semen may be carried out Two conditions must be fulfilled first, that the semen is satisfactory and second that he is able to produce some Some impotent men are not only unable to have coitus but incapable of masturbation, and when this is the case insemination is impossible A case of pregnancy has been recorded where the semen from a nocturnal emission was conveyed by the syringe described on page 21 This marriage had remained unconsummated for 10 years

More uncommon, but important in its bearing on fertility, is the disorder characterized by inability to ejaculate in spite of maintenance of normal erection Sometimes this condition is intermittent and sometimes neither partner is aware of its existence, in fact the diagnosis may be made only when repeated post coital examination of the cervical plug yields consistently negative results For such men masturbation is sometimes possible, but even then the ejaculate may not always contain spermatozoa The condition may be regarded as a defence against losing control, and treatment is accordingly extremely difficult, for the fear that such control may be lost may have become too integral a part of the psychic structure to be easily abandoned Some indication of its early origin is shown by the frequency with which the patients give a history of nocturnal enuresis into late childhood It is easy to see how the danger of ' letting go ' or "soiling"—often so seriously over emphasized in the nursery—may still be influencing the function of adult seminal emission Occasionally, treatment by reassurance and explanation has some effect but sometimes even prolonged psycho analysis fails to effect a cure

A problem commonly met with in the investigation of fertility is that of the husband whose sexual desires are so much inhibited that he is only very seldom conscious of a desire for coitus Such men are inclined to rationalize their disability as due to overwork, or to over-fatigue or ill health, and to question this dubious explanation is usually disturbing to both partners Clearly, it is not possible to gauge what amount of sexual activity is normal for any one man The capacity varies greatly in different individuals and in the same individual at different times Variations in health, fatigue and boredom undoubtedly modify desire Nevertheless, if a healthy man below the early sixties, living in normal conditions, evinces little or no sexual desire, there is usually some evidence to suggest that sexual energy is being unconsciously deflected, often into compulsive and unnecessary "overwork" Many such men show little pleasure in feminine matters or in sexual intimacy, so it is not easy for the wife to exert any deliberate stimulation Persuasion is seldom effective and if suggestions are made as to treatment—e g on such matters as the timing of coitus, or the investigation of semen, or the institution of a post coital test—desire is liable to fail precisely when such procedures depend on its presence, or it may even become submerged completely Delicacy, judgement and kindness are invariably necessary in the handling of such marital situations

It may be hoped that before long there will be a greater number of medical psychologists in all parts of the country to whom such cases may be referred

Finally, there is the problem of the couple whose difficulties are so great that it is most unlikely that normal coitus will ever be established Although many such marriages break down, a surprising number appear to be well adjusted and happy For these it is often of particular *importance that the wife should have the compensation of* childbearing and that the couple should have this bond to cement their marriage, and it may accordingly be advantageous to discuss with them the question of artificially induced insemination There is no reason to believe that the husband's semen would be inferior to the average, but the usual investigations can of course be made If these prove satisfactory the couple may resort either to insemination by the practitioner's aid (see page 111) or, preferably, the wife may be taught to ensure insemination herself by means of semen acquired either during a precipitate coitus

or in any other acceptable way For this purpose she should employ a blunt glass syringe,[1] which should be cleansed only with plain water and dried thoroughly Syringe and receptacle should be warmed to body heat The wife can quite easily learn how to insert such a syringe and inject the semen as deeply as possible into the vaginal passage This can be effected even if severe vaginismus is present, provided that the knees are drawn right up to the shoulders The practitioner should always teach the technique of inserting the syringe and make sure that the wife can manage it efficiently The injection of a little jelly tinged with say, Methyl Violet, is a ready check on the patient s competence Dates approximating to her ovulation time are naturally the best to choose (see page 8)

Although the procedure is obviously exacting for both husband and wife, the fact remains that such couples are sometimes on sufficiently good terms with each other to undertake it, and that it can, in fact, enable them to have children Others, perhaps most, would feel disinclined to attempt it, but may be influenced and encouraged by the physician The kindly approval of the physician is in fact an almost essential prerequisite

It is hardly necessary to add that such cases are handled most successfully by practitioners who are themselves relatively free from inhibitions and embarrassments Those less fortunate would perhaps be wise to refer the task to specialists in these matters As for the couples themselves, they will be found to be most deeply appreciative of assistance in their disability, for often their greatest tragedy lies in the difficulty of getting sympathetic and understanding advice, the lack of which accentuates their feeling of inadequacy and distress The amount of happiness conferred on such a couple by the advent of children is valued out of all proportion to the effort needed to help them to overcome their excessive cultural restrictions

[1] Such as the Vaginal Insemination Syringe obtainable from Allen and Hanbury s The use of this Syringe has been fully described in the Practitioner August 1952

CHAPTER THREE

THE INVESTIGATION OF MALE INFERTILITY

At one time the possibility that the husband might be responsible for the absence of children was not recognized, and operations were performed on the wife without the fertility of the husband having been first ascertained Even nowadays this is by no means rare, and many women are dilated and curetted on the blind assumption that this will do good It is difficult, or even impossible, to supply statistics of the frequency with which the husband is responsible for a barren marriage, for in many cases there are adverse factors on both sides and the responsibility is shared Had the subfertile husband been married to a highly fertile wife, or the subfertile wife to a highly fertile husband, conception would probably have occurred But because neither party is completely fertile the marriage remains without children It is a fair assumption that in about one sixth of all barren unions the husband is so infertile as to make it extremely unlikely that any woman would conceive by him, and in about two-thirds of cases his condition must be considered as a factor in the childlessness This is sufficient to indicate how important it is to make a thorough investigation of the male

THE EXAMINATION OF THE HUSBAND

When a couple remains childless after a reasonable time, say, eighteen months, has elapsed, the usual custom is for the wife to seek medical advice The doctor would do well to point out at this early stage that as both sexes have their responsibility in the production of children, her husband should also submit a specimen of semen for examination If the matter is put properly to him, the husband will seldom object It is important, however, to make it clear that in investigating his fertility his virility is not being called into question Fertility and virility are often con

fused and men are apt to resent any question of their capacity as husbands

The investigation of the husband divides itself naturally into two parts the semen analysis and the clinical examination When later the results of these two examinations are correlated they may be found to throw light on each other, the medical history and the clinical investigation of the genital tract may explain the seminal findings and the latter may perhaps suggest the need for a further clinical investigation designed to discover the cause of the anomalies and deficiencies found in the semen

Although ill health may be a cause of lowered fertility, it is not necessarily associated with this condition It is indeed important that it should be widely known that many subfertile people enjoy robust health, for it is often assumed that because a man is young and healthy, there is no need for him to be examined Many of the men who come for an investigation of their fertility, and who are afterwards found to be subfertile or even sterile, are young and vigorous and in enjoyment of perfect health It is only after they have submitted a specimen of semen for analysis that the true state of affairs is revealed In the rare event of a husband s refusing to submit to the "indignity" of a seminal examination, some indication of his fertility can be obtained from a post coital test (see page 33 and Chapter 5)

The Genital Tract

Before describing the clinical examination of the husband something must be said about the anatomy and the physiology of the male reproductive organs

The genital tract may be divided into three parts the organs for the production of sperms—i e the testes, the accessory glands, and the organs for the storage and conduction of sperms

The Testes——These oval shaped glands are responsible also for the elaboration of an internal secretion which is necessary to the sexual drive—i e the hormone produced by the interstitial cells of Leydig lying between the tubules —but it is with the formation of sperms that we are now mainly concerned On microscopical examination the walls of the tubules are found to be lined with layers of germinal cells in process of maturation Five different types of these cells can be recognized in this order as we pass from the outer layers of the tubules towards the lumen, spermatogonia, primary spermatocytes, secondary spermatocytes,

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The Clinical Examination

Medical History.—When inquiring into the patient's past medical history it should be borne in mind that illnesses occurring at or about the time of puberty are of special importance. For example, an attack of mumps after the age of twelve carries with it a greater risk to the integrity of the testes than an attack before the onset of increased testicular activity. This also applies, in a lesser degree, to illnesses which, unlike mumps, are not associated with testicular complications. The patient's habits, diet and mode of life should also be inquired into, for it is well known that fertility may rise or fall with the general level of health. During this preliminary investigation a special lookout should be kept for any signs or symptoms suggesting dysfunction of the endocrine glands, the pituitary and the thyroid being of particular importance in this connection.

It is also worth while inquiring into the occupation of the patient. Certain chemicals used in industry, such as lead and coal tar products, are absorbed into the body and these may have an adverse effect on the germinal epithelium. Radiation and heat also affect the testes, and although there exist no statistics to support this, it may well be that workers in foundries and research workers exposed to various radiations in physical laboratories may suffer from lowered fertility. When atomic energy is employed on a large scale for industrial purposes, everything will have to be done to protect those who work with atomic piles that is possible. One of the chief difficulties is the disposal of the irradiated water used in cooling, but according to reports the authorities are fully aware of this and are satisfied with the precautions they are taking.

An inquiry should next be made into the sexual history of the marriage and the frequency of intercourse ascertained. It is obvious that a wife is unlikely to conceive if intercourse takes place but rarely.

External Appearances.—The genital tract should be carefully examined with the patient recumbent on a couch. A glance will be sufficient to determine the general configuration of the trunk and limbs and the distribution of body hair. Old operation scars should be noted, especially those situated in the neighbourhood of the genital organs. A herniotomy scar may well have a bearing on fertility, since it is always possible that the vas deferens or the blood supply of the testicle may have been damaged at the operation.

spermatids and spermatozoa In addition to these germinal cells there are certain sustentacular or supporting cells of Sertoli These project radially into the lumen and support and supply nutriment to the more active germinal cells

Spermatogenesis is the process by which the outer layers of cells are transformed into the mature spermatozoa found in the layers adjacent to the lumen Unfortunately it is a process which is very easily upset and it is no exaggeration to say that the cells lining the seminiferous tubules are among the most delicate cells in the whole body, far more delicate than the cells of Leydig which are responsible for the elaboration of the male hormone The formation of sperms may be disturbed not only by local conditions in the testes but also by disorders in other parts of the body, such as infective processes Among the factors influencing the seminiferous function may be mentioned age, nutrition, body temperature, infections, neoplasms, obstructions in the genital efferent ducts, disturbances of circulation, great changes in altitude, constitutional states, endocrine imbalance and irradiation Some of these factors will be discussed later

The Accessory Glands ——The accessory glands which play a part in male reproduction are the epididymes, the prostate, the seminal vesicles, Cowper's glands and the small glands found in the urethral epithelium The epididymes and the vesicles, as well as the vasa, act also as storage places for sperms As soon as spermatogenesis is established in the testis it is believed that waves of activity proceed in a peristaltic fashion from the distal to the proximal segments of the tubules and that sperms pass thence into the rete testis and thence into the coiled tube of the epididymis Here they undergo further maturation and become motile When sexual intercourse takes place the activity of the accessory sexual glands increases and their secretions are poured into the posterior urethra Peristaltic waves begin to travel along the vasa deferentia from the epididymes towards the ejaculatory ducts By the violent contractions occurring at the orgasm the sperms, mixed with the accumulated secretions from the accessory glands, are expelled into the female passages in a series of jets It will be easily realized that with so many glands playing a part in its formation the exact constitution of the semen will vary from time to time Too much stress should not therefore be put on the results of a single semen analysis

swollen many years after he has recovered from his infection The presence of a varicocele is usually of very little moment, but a hydrocele is more often associated with impaired fertility The precise cause of a given hydrocele cannot usually be determined, but many cases are due to a mild infection of the testis or epididymis Even when infection is not present, the testis may be injured by pressure of the surrounding fluid

Abnormalities of the Vas ——An effort should be made to palpate the course of the vas until it merges with the epididymis During the last few years attention has been called to a condition which is usually referred to as congenital absence of the vas It is not usually diagnosed until an attempt is being made to remedy azoospermia by the operation of vaso epididymostomy, when it is discovered that there is no vas to anastomose to the epididymis In some cases the end of the vas is discovered when the cord is followed until it disappears into the external ring, but in others no trace of it can be found The condition is generally put down to a congenital deficiency, but in my opinion this is not always the true explanation In two of my cases it appeared to be the result of some degenerative process of an obscure nature Two inches above the epididymis a vas was discovered It was convoluted, of a yellowish colour, without a lumen in certain areas and distended by a fatty fluid in others, It was very friable and on attempting to dissect it out, it broke and voided, not pus, but a milky fluid Where it had completely disappeared, in the neighbourhood of the epididymis, it was represented by a serpigenous line of fat and this process of degeneration appeared to have spread into the epididymal canal The patient gave no history of having suffered from any previous testicular trouble, and on examining the opposite side, a similar condition was found I am therefore of the opinion that absence of the vas may be either congenital or acquired In the latter case it is due to some degenerative process of which we have at present no knowledge

Examination of Prostate and Vesicles ——After the external genitalia have been examined a finger should be introduced into the rectum to palpate the prostate and vesicles The size of these structures varies greatly in different men and is generally correlated with the size of the external genitalia Thus, in cases of hypogonadism and hypopituitarism, they are small Indurated and tender areas suggest the existence

Attention is now directed to the external genitalia The development of the penis seldom has any bearing on the patient's fertility, although a condition of hypospadias by altering the direction of ejaculation and reducing the likelihood of semen being deposited in the neighbourhood of the cervix, must be regarded as being unfavourable The discovery of a stricture may suggest that the past urethral infection responsible for it was also associated with epididymitis and subsequent blocking of epididymal canals

Examination of Testes ——Great gentleness must be exercised in palpating the outline of the testes and the fingers should have previously been warmed Their size should first be gauged The total mass of the two testes varies greatly in different individuals and, speaking generally, it may be said that those with large gonads are likely to prove more fertile than those with small ones When the testes are so small that they cannot be considered normal signs of hypopituitarism should be looked for The discovery of an undescended or an incompletely descended testicle is of the utmost importance If a testicle is retained within the abdomen its spermatogenic function is generally completely arrested, although it is said that repeated examination of the semen of cryptorchids may occasionally reveal a few sperms An undescended testicle is one which is not fully developed, its development being usually proportional to the stage in its descent at which it has been arrested Even if the testicle on the other side has completely descended, it is sometimes an organ with an impaired spermatogenic function

On palpation, the normal testis feels firm, resistant and elastic Degeneration may be associated with either softness and flabbiness or induration and fibrosis The fibrosis may affect only the coverings of the testicle or it may implicate also its parenchyma Inquiries should be made concerning past trauma All males are likely to be able to recall some minor injury in the past from a kick or a ball This is of little account, but injuries associated with prolonged pain and still more with bruising and swelling are of considerable importance The epididymes should also be carefully palpated, for the discovery of an area of induration at the lower poles is strongly presumptive of a past attack of epididymitis and of the possibility that the canal on that side is occluded It is remarkable how long such signs of a past infection may persist It is often possible to tell a patient which of the two testes was previously

never be used for collecting semen, because it may contain sufficient traces of the chemicals used in its manufacture to arrest the motility of the sperms Semen should be collected in a dry, clean wide-mouthed bottle or glass tube equipped with a well fitting stopper The tube should be warmed in the axilla to blood heat before the collection of the semen and then allowed to cool down gradually The methods sometimes employed by patients to keep the specimen warm are likely to do more harm than good, since a temperature of 37° C provokes great sperm activity so that by the time the specimen reaches the laboratory the sperms are in a state of exhaustion All that is advisable is that the receptacle should be placed in a small box wrapped in cottonwool, this is sufficient to ensure that cooling is not too sudden The specimen should arrive at the laboratory within two or three hours of its collection Should a specimen be sent by post all that the analyst can do is to study the morphology of the sperms and to estimate their number No information can be given in such a case as to their motility and viability

When freshly ejaculated, healthy semen is a gelatinous fluid which afterwards becomes more liquid The time taken for this varies in different patients and is influenced by the surrounding temperature, but liquefaction is usually complete within an hour Those laboratories which specialize in semen analysis usually report their findings in a special form under the various headings set out below The forms used by the Family Planning Association Laboratories are reproduced in Appendix 6

Volume

The total volume of semen expelled at a single ejaculation varies widely on different occasions and is, to some extent, influenced by the length of the preceding period of continence In most men it ranges between 2 and 5 c c A large volume must be considered favourable to conception because it provides a satisfactory pool from which sperms may eventually reach the cervix A large quantity of semen is also more efficient in buffering the acid secretions contained in the vagina It is sometimes assumed that a large volume is necessarily associated with a low sperm count, but this is not always the case When the volume is unusually small three explanations must be considered—faulty ejaculation, reduced secretion in the accessory sexual glands, or obstruction of both ejaculatory ducts There is a type of case, by no means rare, in which only a few drops of opalescent

of infection, and when these are found prostatic fluid should be obtained by massage for examination If no fluid can be expressed from the meatus the urine passed subsequently to the massage should be examined for the presence of pus or threads Normal prostatic secretion contains only a few leucocytes, not more than one or two per microscopic field Sperms may also be found in the expressed secretion but their presence or absence is of no significance In no case should the examination of the secretion expressed by massage and the discovery of sperms in it be regarded as a substitute for semen analysis When pus cells are found in the urine a bacteriological report will be of advantage

Further Clinical Examination ——It has been said that the germinal cells of the testis are among the most delicate in the body and that all infections, wherever they are situated, may have an injurious effect on them This being so the clinical examination of the patient must be a very comprehensive one if foci of infection in the throat, sinuses, teeth, lungs and intestinal tract are to be excluded Such an examination should, however, be postponed until the report on the semen has been received and there are clear indications that it is needed Otherwise much unnecessary trouble will have been taken

LABORATORY TESTS AND OTHER EXAMINATIONS

Semen Analysis

The importance of the semen analysis in the investigation of male fertility cannot be over stressed It should be realized, however, that the subject has now become so specialized that there are comparatively few laboratories in which a complete and entirely satisfactory analysis can be undertaken Reports submitted by those who have no special experience of this type of investigation should therefore always be accepted with some degree of caution It is to be hoped that when the importance of the proper treatment of subfertility is more widely realized, the general level of semen analysis throughout the country will be raised

Collection of the Specimen ——Errors which may seriously affect the results are often made in collecting the semen There are two methods of obtaining a specimen—by withdrawal and by masturbation—and it may be left to the patient to decide which of these is the more acceptable to him It is usual to prescribe three or four days' continence prior to the taking of a specimen A rubber sheath must

seminologists For example, Harvey and Jackson place the abnormality rate which should be regarded as a sign of infertility as high as 35 per cent

It should be borne in mind that the type of abnormality is of some importance, ill formed heads being more un favourable than ill formed tails Davidson accepts a semen as adequate when the abnormality rate for heads is not over 25 per cent and for tails not over 30 per cent, provided the total abnormality rate does not exceed 35 to 40 per cent Abnormalities may be the result of imperfect spermatogenesis, of arrested development with premature detachment from the germinal epithelium, or of the degeneration ofwhat was originally a satisfactory sperm Other cells of testicular origin may also be found in the semen, but unless these are present in large numbers they are of no particular moment

The discovery of leucocytes is of greater importance If they are present in large numbers (one million per c c or more) an infection of the genital tract, but not necessarily of the tubules, must be suspected Organisms as well as leucocytes may be found in the semen but it must not be assumed that they are an indication of tubular infection They are often due only to accidental contamination of the semen after or during emission

Motility

Motility is not necessarily equivalent to fertilizing capacity, since a highly abnormal type of sperm may still be actively motile But it is obvious that the ability of a sperm to reach the ovum depends to a large extent on its own activity and that when motility is poor it is much less likely to prove successful

It must be remembered that the initial motility of sperms in freshly ejaculated semen is generally poor, it is only after liquefaction has taken place that movement becomes vigorous Motility persists for varying lengths of time in different specimens and under different conditions of storage Some motile sperms may be expected to survive in good quality semen for as long as twenty four hours at 37° C If the semen is kept at cool room temperature (about 20° C) it is not uncommon to find some sperms still moving seventy two hours after ejaculation (the maximum so far observed is five days), while at 4° C motility may be retained for as long as seven days These figures refer to undiluted semen, if the semen is diluted 1 in 10 or 1 in 20 with a suitable medium—e g Walton s buffered glucose

fluid are submitted for examination These cases of complete failure to ejaculate have been considered on page 19

Density of Sperm Population

Great variations are found in the number of sperms contained in a cubic centimetre of semen and authorities differ as to the level below which a man should be considered infertile Hotchkiss records that in 150 barren marriages (in which the wives were without major faults) the sperm count gave an average of 64 million as compared with an average of 120 million among 200 men whose wives had conceived He does not state however whether cases of azoospermia were included in the first group Meaker holds that most fertile men have counts of over 100 million and that conception rarely occurs when the count is below 60 million To the writer (K M W) both of these authorities appear to lay too much stress on density of population and to have set the standard of normality too high This view is shared by those working at the Exeter Clinic Harvey and Jackson (1945) state that, in a group of 44 husbands showing densities of between 26 and 50 million, 22 produced pregnancies (16 while under observation and 9 without any treatment) These workers also record conception occurring in cases in which the sperm counts have *been consistently below 5 million per c c* The lowest counts so far recorded in a husband known unquestionably to have produced a successful conception are 0 4, 1 0, 0 1, and 0 2 million per c c In this case the four specimens were examined within a period of seven months, two before and two after the conception occurred (personal communication)

Abnormality Rate

It is generally accepted that the semen of highly fertile men and animals contains few sperms of abnormal structure *A high rate of abnormality may therefore be regarded* as a sign of infertility There is difficulty in establishing a standard of normality as different abnormality rates are likely to be found in a given specimen of semen by two different observers, particularly if methods of fixing and staining are dissimilar Hotchkiss found that the average percentage of abnormal sperms among 105 husbands whose wives were barren was 15 per cent, whereas among 200 men of proved fertility it was only 11 per cent These figures are much lower than those supplied by British

40 per cent there should not be more than 20–25 per cent of the sperms with abnormal heads

Basic Motility

In a specimen received for examination half an hour after production at least 50 per cent of the sperms should be motile after the specimen has been incubated for 1 hour at 37 C in suitable diluting fluid

Viability

For a specimen received half an hour after ejaculation and kept at 37 C in suitable diluting fluid the fall in the percentage of motile sperms between the first and third hour of incubation should not be more than 20 per cent, and between the first and fifth hour not more than 50 per cent, and this fall should be so distributed that the ratios of the percentage motility at 1 and 3 hours, and at 1 and 5 hours add up to at least 1 5

(If the specimen has been produced more than half an hour before it is received for examination the basic motility and viability will be relatively lower)

Fuller details will be found in Appendix 6

It must be remembered that any analysis refers only to the particular specimen which at that moment is under consideration Another specimen examined a short time afterwards may give either a less favourable or a more favourable result and it is only after the examination of several samples that any reliable conclusions can be drawn as to the general level of the patient s fertility

Grades of Fertility

As a guide to the practitioner it may be helpful to append a table which shows the relative frequency of the various grades of male fertility found in practice This table is based on the semen findings in a series of 972 men and we are indebted to H A Davidson for its use It should be realized first that it does not give any indication of the incidence of male fertility in the community All these husbands were examined because their wives had not yet produced a child or else had failed to give birth to a second child It was thus a highly selected group and not a fair sample of the population See Table 1, p 34

Post-coital Tests

It must be borne in mind that a semen analysis only reveals the state and the behaviour of sperms within the male secretions, and that it throws no light on how they will behave when ejaculated into the female passages

solution (see p 237)—the period of survival is increased at all temperatures by a few hours A rapid loss of motility, especially if it is associated with agglutination, must be looked upon as being an unfavourable sign The condition known as necrospermia, in which no movement at all is observed in a fresh specimen, is extremely rare It is usually the result of a faulty method of collecting the semen

Harvey and Jackson (1945) defined basic motility as the percentage of progressively motile sperms found in diluted semen after an hour s incubation at 37° C From a number of observations on men of proved fertility, they constructed a composite curve which indicates the minimum values for basic motility which can be regarded as satisfactory for specimens received for examination at different times after emission The essential data are tabulated in Appendix 6

Viability is judged by observing the fall in activity which occurs in diluted semen kept at 37° C after *two hours and* again after five hours In satisfactory specimens there is usually little reduction in motility between the first hour and third-hour observations, but the motility may fall to half its original value by the fifth hour This is true of specimens received in a laboratory within three hours of ejaculation Should greater delay occur motility is likely to fall more rapidly (For further details of methods see Appendix 6)

The Interpretation of Semen Findings

It may be helpful to give some indication of what can be passed as a satisfactory semen What should we expect of a man if he is to be considered capable of bringing about conception? It should be realized that it is impossible to lay down any hard and fast rule, for the assessment of the value of the semen does not depend on one or even two items, but on the general impression it gives The author (K M W) is indebted to Margaret Jackson and H A Davidson for their help in this attempt to draw a line be tween satisfactory and unsatisfactory semen

A specimen cannot be regarded as entirely adequate unless it satisfies the following conditions

Volume

1 5 c c or over

Density

40–50 million per c c

Morphology

60–65 per cent of the sperms should be normal

Note Although the *total* abnormality rate may be as high as

incision is made in the scrotum and the glistening white tunica of the testis is exposed This is then stabbed with a pointed tenotome If the scrotal incision is made under local anæsthesia, this stab will cause pain unless the cord has been infiltrated previously with the anæsthetic A small button of testicular tissue can be extruded through the wound in the tunica albuginea by a little gentle pressure This is snipped off with fine iridectomy scissors and placed immediately in a small tube containing Bouin's fixing solution Bleeding from the testis usually stops with pressure, but if it continues the bleeding point should be underpinned with a suture of fine catgut The patient should be kept at rest for some hours after the operation in order to reduce the risk of hæmatoma formation He should also wear a suspensory bandage for a few days

What help can be expected from the biopsy report on the testis? First it will throw valuable light on the previous seminal findings An example of this has already been given above in connection with the differential diagnosis in cases of azoospermia If no sperms have been found in the semen and yet the section of the testis shows active spermatogenesis in the great majority of tubules, it is almost certain that the azoospermia is due to occlusion of the ducts Occasionally the appearance of the tubules may provide some hint as to the precise cause of the infertility, suggesting, for example, that it is due to infection, or to toxæmia or to irradiation The biopsy will also assist prognosis and allow us to decide whether treatment with hormones can possibly have any favourable result When a section of a testis is examined under a microscope considerable variations will usually be found in different parts of it, some tubules even showing spermatogenesis, while others are in a state of complete degeneration In other words, those lesions which impair fertility are likely to have a patchy distribution in their initial stages Later, if the process continues, the whole of the seminiferous function of the testis will be destroyed

Five broad types of reports may be received from the microscopist that normal spermatogenesis is in progress in most tubules, that spermatogenesis stops at a level below that of full maturation, that many of the tubules are under going degeneration, that they are so much destroyed that they are only represented by fibrous tissue, or that some gross lesion is present, e g a severe chronic infection such as caseous tubercle

TABLE I

RELATIVE FREQUENCY OF VARIOUS GRADES OF MALE FERTILITY

Grade of fertility	*Total numbers*	*Percentage*
Men who could be passed as fertile and capable of bringing about conception in a fertile wife	255	26
Borderline cases	116	12
Definitely subfertile	509	52 5
Completely sterile	92	9 5

Even a feebly moving sperm may succeed in penetrating a normal cervical plug and a vigorous sperm may fail to invade one that is abnormal A post coital test (known also as a Sims test or Huhner s test) is therefore a useful addition to a semen analysis By examining a sample of mucus from the wife's cervix a few hours after intercourse extremely valuable information can be obtained about the reactions of the husband's sperms to her secretions Post coital tests have thrown considerable light on barren marriages and they should always be carried out when, in spite of favourable reports on both sides, the wife fails to conceive

Observations show that sperms survive in the vagina for only a few hours, but that in the cervical mucus they can survive much longer, as long, indeed, as 150 hours after intercourse *A post coital test provides therefore* useful information concerning the viability of sperms The technique and findings are described in Chapter 5

Testicular Biopsy

The microscopic examination of a small fragment of testis settles not only the question whether an azoospermia is due to a blockage in the efferent duct system or to an absence of spermatogenesis, but it also reveals the state of the seminiferous tubules As it inflicts but little hardship on the patient and can be carried out under local anæsthesia or a short intravenous anæsthetic, it should always be resorted to in case of doubt Testicular biopsy also provides an ideal method of controlling treatment, as without it patients may often be subjected to long and costly courses of injections without any hope of their being successful It is useless, for example, to give a patient hormones in the hope of stimulating spermatogenesis if the tubules are in a state of complete fibrous degeneration

The technique of the operation is as follows A half inch

prolonged subfertility Should there be any doubt concerning the adequacy of the patient's diet he should be given vitamin E in the form of wheat germ oil capsules in doses of 10 to 15 mg daily (Some recent investigators have advised much larger doses) This may be supplemented with capsules and tablets containing A, B, C and D as well

Pyrexia

It has long been known from animal experiments that an increase in body temperature reduces or brings to a standstill the spermatogenic function of the testis, and it is generally believed that the higher temperature within the abdomen is an important factor in the infertility of cryptorchids Recently MacLeod and Hotchkiss, in a study of six healthy male volunteers who underwent a single fever treatment, found that their sperm counts sank to a low level from 25 to 55 days after the treatment and that this low level was maintained for from fifteen to fifty days after the initial fall It is obvious therefore that the fever as well as the toxæmia is of importance in cases of infertility following acute infections

Constitutional Causes

Among these causes endocrine disorders are of special importance Thus, it is certain that thyroid disturbances and hypopituitarism and hypogonadism have a profound effect on spermatogenesis, and some workers indeed regard endocrine imbalance as the underlying cause in most cases of infertility in which no local cause in the genital tract can be found Unfortunately, it is impossible to confirm or refute this extreme view, for minor degrees of endocrine deficiency cannot at present be detected either by clinical examination or by laboratory tests

There are reasons to believe that the disturbances occurring in the endocrine glands and the central nervous system in such conditions as neurasthenia and anxiety states have some influence on spermatogenic function This may account for the fact that some infertile couples, after adopting a child and thus securing relief from their anxiety, proceed to produce children of their own

Infrequent and Unsatisfactory Intercourse

These factors in male infertility have been discussed on page 19

CHAPTER FOUR

THE CAUSES AND TREATMENT OF MALE INFERTILITY

Ætiology

Many of the factors responsible for infertility are still unknown and the most complete investigation will often fail to reveal why a young man in excellent health and with an apparently normal genital tract is either sterile or so infertile that his wife is unlikely to conceive At one time the writer (K M W) made careful inquiries into the fertility of the patient's parents, grandparents and married brothers and sisters in the expectation that sometimes genetic factors might explain such cases, but there was no evidence that this was the case It is, of course, obvious that the words "hereditary sterility" are a contradiction in terms, but a reduced level of fertility might well be passed on from parent to child, and indeed R A Fisher has put forward cogent arguments for the view that it is

Age

Unlike the female, the male may be able to reproduce himself until quite an advanced age Exner reports that in a group of 165 elderly men sperms were found in the semen in the following percentages between sixty and seventy in 68 5 per cent of cases, between seventy and eighty in 59 5 per cent and between eighty and ninety in 48 per cent While it is true that elderly men retain the capacity to reproduce themselves the density of sperm population is likely to be less in an old than in a young man s semen

Faulty Nutrition

It is well known that for the health of the testis the diet must contain an adequate amount of vitamins A and E, but under normal conditions it is seldom that infertility can be explained by dietary deficiency Under war conditions, however, this factor may well be decisive, for our recent records include several patients whose privations in Japanese prisoners camps have resulted in serious and

generally been exaggerated Its chief danger is that it may produce a bilateral epididymitis with occlusion of the epididymal canals Fortunately, the treatment of this disease has been revolutionized by the discovery of penicillin and the sulphonamides By these powerful remedies the progress of the disease is rapidly arrested and it can be confidently anticipated that such complications as bilateral epididymitis will become rarities in the future (The treatment of an established occlusion of the epididymal canals is discussed on page 40)

Should epididymitis occur in the course of a genital infection, gonococcal or otherwise, it is probable that the risk of a subsequent blockage will be reduced by early multiple small incisions into the swollen epididymis with a pointed tenotome

Mumps

The orchitis which occurs as a complication of mumps is an important cause of infertility, especially if the attack occurs during or after puberty The frequency of the complication ranges, according to various authorities, from 17 per cent (Bernard) to 33 per cent (Laveran) Unilateral involvement is commoner than bilateral in the proportion of 10 to 1 The orchitis usually develops when the parotid swelling is at its height but in rare cases may precede it It is now becoming recognized that pressure exerted for even a few hours upon the testicular germinal cells may be sufficient to destroy the future reproductive capacity of the young patient These cells are so delicate that merely a temporary arrest of blood supply may lead to necrosis and subsequent testicular atrophy Even if atrophy does not occur the tubules are generally damaged, with subsequent azoospermia in graver cases, and oligozoospermia in those less severe This is one of the commonest causes of azoospermia in a healthy young man In such cases the Leydig cells are not affected and the endocrine balance is in no way disturbed In all cases of acute orchitis, therefore, particularly when the patient is past puberty and the swelling is bilateral, immediate steps must be taken to relieve the tension in the swollen organs by multiple small incisions This is best done by exposing the testicle through a scrotal wound and stabbing the swollen organ in several places with a pointed tenotome This treatment is also to be recommended in cases of acute epididymitis in which there is always the risk of subsequent occlusion of the epididymal

Treatment of Lesions of the Genital Tract

Arrested Descent of the Testicle

It has been said that an undescended testicle is also an incompletely developed testicle and the degree of failure in spermatogenic function is generally proportional to the level at which the testicle has come to rest The question arises whether the function can be restored by bringing the organ down into the scrotum In the writer's (K M W 's) experience an operation is not likely to prove beneficial if postponed until the patient is adult When carried out earlier it is more likely to have satisfactory results Thus, MacCollum (1935), in an investigation of 89 patients with imperfectly descended testicles subjected to orchidopexy 10 to 30 years previously, estimated their fertility as being 61 per cent of what might be considered normal, in contrast to the estimated 10 per cent of fertility in patients who had not undergone any operation This clearly indicates the desirability of operating if descent does not take place either spontaneously or by endocrine therapy on a boy's reaching puberty

Varicoceles and Hydroceles

An operation on a varicocele is more likely to impair the function of the testis than to improve it Ligature of the veins in the cord is often followed by fibrotic changes in the testicle and by the appearance of hydrocele Nor is it advisable to operate on hydroceles unless they are tense and causing pressure on the testis As many so called idiopathic hydroceles are in reality infective in origin too much must not be expected of any operation

Infections of the Genital Tract

Experiments on dogs have shown that the sulphonamides may induce an arrest of spermatogenesis, and for this reason their use was for a long time avoided in the treatment of infertility associated with infections But it is now known that this action is only temporary and not likely to occur unless large doses are given, there is accordingly no objection to the administration of these drugs for the treatment of infections, whether in the genital tract or elsewhere in the body Penicillin may also be used When the prostate and the vesicles are infected, prostatic and vesicular massage should be instituted

Gonorrhœa has in the past been looked upon as a major cause of sterility, but its importance in this respect has

only hope of overcoming it is by the operation of vaso-epididymostomy, first advocated by Martin in 1909 Owing to the smallness of the structures involved and the liability of the new opening to become fibrosed during the process of healing, this operation was so seldom successful that for a long time it fell into disrepute, but interest in its possibilities was revived when Hagner in 1931 reported 19 successful results in 31 cases

The technique usually employed is as follows After liberation of the testicle from its coverings the vas is isolated in the neighbourhood of the globus major and a lateral anastomosis made between it and the epididymal canal Before doing so the operator must make sure that sperms are plentiful in the part of the epididymis selected for anastomosis The finest silk and needles, such as those used for operations on arteries, and ophthalmic instruments should be used Hagner employs as a suturing material the finest silver wire During convalescence gonadotropic hormones should be given Even if the operation is successful it may be several months before sperms reappear in the semen

Hormone Treatment

The hormones commonly used in the treatment of male infertility are testosterone and anterior pituitary like hormones The administration of thyroid gland is desirable in the cases in which there are also signs of hypothyroidism, and it may be helpful to middle aged men whose sexual capacity is on the wane

Testosterone —This hormone acts chiefly on the accessory sexual glands and on the ejaculatory mechanism, and there is no reason to believe that it has a stimulating effect on the seminiferous tubules Some authorities, indeed, hold the view that its action on spermatogenesis is depressing and that it should not be given in cases of oligozoospermia That testosterone *increases* the activity of the accessory sexual glands is shown by the greater volume of the semen that usually follows its use Among the accessory glands are the epididymes and it is in these organs that the sperms reach the final stages of their maturity The use of testosterone is therefore particularly indicated where the volume of the semen is small and when many abnormal sperms are found in the semen Because of its action on the ejaculatory mechanism it may also be given a trial in cases of blockage of the ducts

canal It might be thought that a haphazard puncture of the epididymis with a tenotome would itself inflict damage on the canal, but experience has shown that there is less risk of this than of damage from the acute infection Rest in bed during an attack of mumps does not appear to reduce the incidence of orchitis materially and it is to be hoped that a serum will eventually be found which has a protective action on the testicle Prophylactic treatment by stilbœstrol is being tried out, particularly in America, and although it is too early to pass judgement, it would appear to be of considerable value as a preventative measure

Trauma

The function of the testis may also be damaged by trauma As previously stated minor injury is not likely to have any further result than immediate discomfort, but where the blow has been severe enough to cause swelling and prolonged pain, permanent damage may result Still more serious is the damage done by a partial torsion of the cord which is spontaneously corrected The interference with its blood supply may cause permanent damage to the seminiferous tubules A clumsily performed operation for the radical cure of a hernia with post operative swelling of the testicle may have a similar result

Occlusion of the Efferent Ducts

The commonest situation for a blockage is in the epididymal canal but the ejaculatory ducts may also be stenosed as a result of previous attacks of prostatitis It is believed that obstruction of the vas deferens is of rarer occurrence, but the clinical investigation of this structure is exceedingly difficult The treatment of an occluded ejaculatory duct is also very difficult and it may be impossible If no help is obtained from a long course of prostatic massage (and this is only likely to be successful when the obstruction is recent and due to inflammatory exudates which have not yet become organized into adult fibrous tissue) an attempt may be made to catheterize the duct through a posterior urethroscope Unfortunately the opening on to the verumontanum is often so situated that this is impossible The utmost gentleness must be exercised throughout the operation, as otherwise more harm than good may be done

If the obstruction is situated in the epididymal canal the

or deficient sperm the embryo is likely to die with consequent miscarriage This relationship between male infertility and miscarriage is receiving attention by certain workers who maintain that a high ratio of abnormal sperms may come to be recognized as an important factor in repeated abortion

General Advice to Patient

The treatment of infertility in the male is often tedious and prolonged and it is best to warn a husband that it may be so He should be told not to expect any quick results and not to be disappointed if the treatment has to be changed because it has proved unsatisfactory The desire for a child may be very strong and both husband and wife are liable to become impatient and over anxious if improvement in their condition is not soon apparent It is better therefore not to embark on what may be a long and expensive treatment unless they are prepared to persist with it, the cost of a six weeks' course of hormone therapy may entail an expenditure of some £3 5s on preparations alone

Tact must always be shown in discussing prognosis with the patient and it is only in exceptional cases that he should be told that this is hopeless Our knowledge of the factors responsible for such a condition as oligozoospermia is indeed so elementary that it is rarely possible to give a dogmatic prognosis Sometimes, indeed, the unfavourable features in the semen disappear at a later date without treatment Not only do many men feel that they are in some way to blame for their subfertility, but owing to the confusion which exists in their minds between subfertility and sexual capacity, the news that they will never be able to give their wives children undermines their potency For this reason alone a too adverse report should never be given

Testosterone propionate is usually administered by intramuscular injections and is put up in ampoules containing 5, 10 and 25 mg Methyl testosterone can be given orally in doses of 5 to 15 mg daily, it is best absorbed by allowing the tablet to dissolve slowly under the tongue Sometimes the author employs an emulsion of crystals prepared under the trade name of Micryston Testosterone, which in doses of 0 5 to 1 c c injected into muscle provides a deposit from which hormone is absorbed into the system for several days An injection of such an emulsion has thus an action comparable to that produced by the implantation of pellets under the skin

Anterior Pituitary-like Hormones ——Unfortunately our supply of anterior pituitary like hormones is less satisfactory than that of androgens Those in most common use are prepared from the anterior lobe of animal pituitaries (A L P), from the urine of pregnant women (P U) or of menopausal or oophorectomized women (OO), and from pregnant mares serum (M S) All these extracts have in common the capacity to stimulate ovarian development in other words, they are gonadotrophic hormones They may be used therefore to stimulate testicular activity and are particularly indicated in cases of oligozoospermia and asthenospermia (poor motility and viability)

The most useful preparations for this purpose are hormones prepared from pregnant mares serum (e g Gestyl), injected twice a week to a weekly total of from 1200 to 2000 units Unfortunately such preparations are inevitably expensive, and few patients can afford the large doses sometimes prescribed After six weeks' treatment another specimen of semen should be analysed

Up to the present treatment with all anterior pituitary-like hormones has been disappointing, but it is only fair to add that hormones of this type are frequently used in hopeless cases in which the tubules are so badly degenerated that no treatment could possibly be of avail Whenever it is possible to do so, hormone therapy should be controlled by testicular biopsies The injection of these hormones is rarely followed by ill effects, but a few patients may of course show an allergic reaction to horse serum

Male responsibility for Miscarriage

It should be remembered that a husband s responsibility for the birth of a child does not end with the fertilization of his wife Should the ovum be fertilized by an unhealthy

or deficient sperm the embryo is likely to die with consequent miscarriage This relationship between male infertility and miscarriage is receiving attention by certain workers who maintain that a high ratio of abnormal sperms may come to be recognized as an important factor in repeated abortion

General Advice to Patient

The treatment of infertility in the male is often tedious and prolonged and it is best to warn a husband that it may be so He should be told not to expect any quick results and not to be disappointed if the treatment has to be changed because it has proved unsatisfactory The desire for a child may be very strong and both husband and wife are liable to become impatient and over anxious if improvement in their condition is not soon apparent It is better *therefore not to embark on what may be a long and* expensive treatment unless they are prepared to persist with it, the cost of a six weeks' course of hormone therapy may entail an expenditure of some £3 5s on preparations alone

Tact must always be shown in discussing prognosis with the patient and it is only in exceptional cases that he should be told that this is hopeless Our knowledge of the factors responsible for such a condition as oligozoospermia is indeed so elementary that it is rarely possible to give a dogmatic prognosis Sometimes, indeed, the unfavourable features in the semen disappear at a later date without treatment Not only do many men feel that they are in some way to blame for their subfertility, but owing to the confusion which exists in their minds between subfertility and sexual capacity, the news that they will never be able to give their wives children undermines their potency For this reason alone a too adverse report should never be given

within eighteen hours of her visit, and to avoid douching or bathing between whiles If no sperms or only a few inactive forms are found at this interval, examinations at progressively shorter intervals after coitus should be made

The actual technique of carrying out the test is comparatively simple As already stated, material for a complete examination should be collected from the vaginal fornices and from the cervical canal

Vaginal Material ——The simplest method of collecting material from the vagina is by means of a small spoon, made of bakelite or other plastic (see Fig 2B, opposite), passed well up into the fornices before a speculum is inserted and gently scooped round A loopful of the material so collected is placed on a clean slide, mixed with a drop of normal saline and covered with a cover slip, it is then ready for microscopic examination Observation is made easier by cutting down the light with the diaphragm, but dark ground illumination is quite unnecessary for the detection of sperms and such organisms as trichomonas and monilia

Cervical Material ——For the collection of an adequate sample of cervical mucus the use of a platinum loop (as advocated by Huhner) is seldom adequate The quickest *and at the same time most efficient method is by means* of suction using a slightly curved cannula with a *lateral* hole (see Fig 2C) A Bonney's intrauterine cannula or a male silver catheter does very well for obtaining samples from the lower cervical canal, but something finer is needed for removing material from near the internal os An ordinary 10 c c syringe or a firm rubber bulb will be found adequate for effecting suction It is worth mentioning as a practical point that cannulæ used for collecting samples of mucus must, after each test and before sterilization, be washed very thoroughly with a good detergent, such as "Brillianz" made by Messrs G Gurr & Co , lest fragments of mucus containing sperms should be left behind to confuse the result of a subsequent test

Having exposed the cervix with a bivalve speculum and wiped the vaginal surface with dry, clean cottonwool, samples of mucus are then collected, if possible one from the lower and one from the upper cervical canal, using different cannulæ for each sample Great gentleness is needed, for otherwise bleeding will occur from the cervical mucosa, and although this does not matter as far as the patient is concerned the blood obscures the microscopic field and vitiates the *p*H estimation The mucus is expressed



FIG 1 F eld f om vagina ho ing h a y gro th of mon lia and many detacl ed on dia

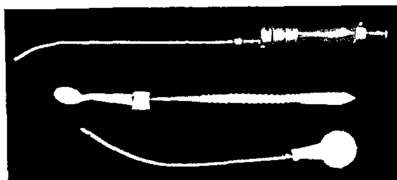


FIG 2 Instruments needed for collect ng vaginal fluid and cervical mucus

A F ner cannula with lateral hole made to fit reco d s r nge whereby suction can be effected for mucus from upper cervical canal B Bakelite spoon and holder C W de bore annula with lat al hole and bulb for suct on for mucus from lower cervical canal

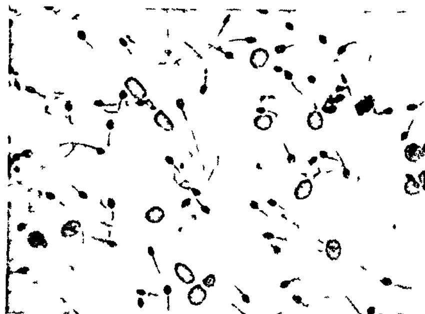
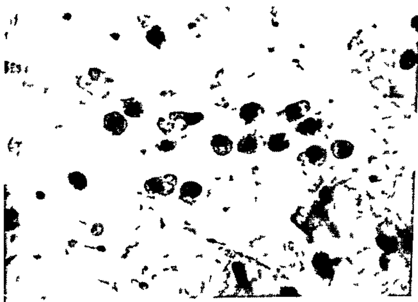


FIG 3 Post-coital cervical mucus

A Typical good field—clear mucus with plenty of normal sperm easily found and few polymorphs or mucus cells about 50 per cent of these sperm were motile 18 hours after coitus

B Poor field—granular opaque mucus few sperm found after searching many polymorphs and mucus cells None of these sperm were moving 15 hours after coitus



on to a slide and, without dilution, is compressed between cover slip and slide The post-coital specimen of mucus is then ready for direct examination

The following data should be recorded for each test the date in the woman's menstrual cycle, the number of hours that have elapsed since coitus, notes on the result of the examination of the wet films together with observations on the naked-eye appearance and the abundance of both vaginal fluid and cervical mucus Notes on the microscopic examination should include the following particulars

The Vaginal Fluid——The character and abundance of epithelial squames and of leucocytes, the types and profusion of bacterial flora, the presence or absence of trichomonas or monilia, the presence or absence of sperms and whether those present are motile or immotile (Fig 1, facing page 46)

The Cervical Mucus——The character and abundance of bacteria and of cellular elements (which will include leucocytes, squames from the vagina, cells from the cervical mucosa and occasionally red blood corpuscles), a rough estimate of the percentage of clear or practically clear fields to those packed with cells and/or granular debris and bacteria, the presence or absence of sperms with a rough estimate of their numbers (i e *x* sperms in *y* fields) and of the proportion of sperms that are motile (see Fig 3, opposite)

Stained films can of course be made from both vaginal and cervical samples, details of methods of fixation and staining are given in Appendix 6

Similarly, estimations of *p*H can be made after the material has been taken to the laboratory, preferably by means of the quinhydrone electrode, because of the protein error inseparable from colorimetric methods of estimating *p*H in fluids such as those we are dealing with

Further useful information can be gathered by carrying out invasion or incompatibility tests (Miller and Kurzrock, 1932, Lamar, Shettles and Delf, 1940, Barton and Wiesner, 1946), in which the woman's cervical mucus is examined *in vitro* mixed (*a*) with semen from her husband and (*b*) with semen from a man of known high fertility In these tests mucus is collected from the woman at least ten days after the last coitus and, either on a slide or in a capillary tube, is brought in contact with the semen to be tested Observations are then made of the rate and degree of invasion of the mucus by the sperms and the duration of their survival in it (See Appendix 6)

TABLE 2

TYPICAL VARIATIONS IN THE "NORMAL" FERTILE VAGINAL AND CERVICAL FILMS DURING MENSTRUAL CYCLE

	Menstrual phase First week	*Postmenstrual phase Second week*	**Ovulation**	*Postovulatory phase early secretory Third week*	*Premenstrual phase late secretory Fourth week*
VAGINA					
*p*H	5 5–6 5	4 5–5 5	**5 5–6 0**	4 3–5 0	4 5–5 5
Epithelial cells					
Superficial					
Cornified	—	few	+	+ +	+
Uncornified	—	+	+	some	+
Basal	some	—	—	—	—
Red blood corpuscles	+ +	—	**few**	—	few
Leucocytes	+ +	some	**few**	+	+ +
Bacteria	+	+	**few**	+	+ +
Sperms can be found within 18 hours of coitus at any stage in the cycle—but not easily during menstruation Motile sperms can seldom be found later than 2 hours after coitus except where there is a profuse spill of cervical mucus					
CERVIX					
*p*H	7 5–8 5	7 0–8 0	**8 0–8 5**	7 0–8 0	7 5–8 5
Amount of mucus	scanty	increasing	**plentiful**	decreasing	scanty
Appearance of mucus	cloudy	moderately clear	**clear**	moderately cloudy	cloudy
Consistence of mucus	moderately runny	moderately runny	**runny**	moderately tenacious	tenacious
Leucocytes and mucus cells	+	+	**few**	+	+ +
Red blood corpuscles	+ +	—	**few**	—	some
Thread[1]	short	moderate	**long**	short	none
Sperms up to 40 hours after coitus	present sometimes motile	present usually motile and progressing	**present motile and progressing**	present sometimes motile	present massed and often immotile

[1] Thread or Spinnbarkeit was described as one of the rheological properties of mucus by A F Clift in the *Proceed gs of the Royal Society of Medicine* 1945 39 1

For a discussion of the bacteriology of the cervical canal and the difficulties encountered in culturing organisms from this situation reference may be made to any standard work on bacteriology—e g Cruickshank's *The Normal Bacterial Flora of Man* Although a diversity of micro-organisms, often in profusion, can commonly be demonstrated in Gram films of cervical mucus, it is not easy to culture them There seems little doubt that the normal cervical secretion contains a bacteriostatic or bacteriolytic substance, possibly a lysozyme similar to that described by Alexander Fleming in 1932 as occurring in many human fluids and tissues, particularly in those which stand guard at points where invading micro-organisms have easy access to delicate mucus membranes (e g tears, nasal mucus, sputum) Oddly enough, although he examined a great number of secretions and tissues, cervical mucus was apparently not among them, at any rate it is not mentioned in his paper

Interpretation of Post-coital Tests

The interpretation of the results of post-coital tests is not simple, indeed it is impossible to define in precise terms those findings which may be regarded as satisfactory or those which must be regarded as negative or unsatisfactory It is clear, however, that one "bad' result cannot be accepted as final, nor indeed that one "good" result can entirely exonerate the husband The examination may have to be repeated many times, and at various intervals after coitus, before an opinion can be given It is not widely enough recognized that, during the various phases of the menstrual cycle, the vaginal smear and cervical mucus in the normal fecund woman undergo considerable and regular changes in cellular content, *p*H, amount, consistence and receptivity to sperm These changes, which call for careful study, are set out in Table 2

Findings in Fertile Women

It will be seen that in the case of a fecund woman married to a fecund husband one may expect to find sperms in the vagina readily up to eighteen hours after coitus but with some difficulty later than this, only very rarely, however, will sperms remain motile in this situation for more than two hours In other words those sperms that fail to enter the cervical canal soon can be regarded as a

dead loss as far as fertilization is concerned In the cervix, however, at about the mid point in the cycle (i e round about ovulation), plenty of progressively motile sperms will commonly be found up to forty hours or even longer after normal coitus (The longest interval noted by the author was 120 hours) Just after and before menstruation, intra cervical sperms are often immotile even very shortly after coitus It will moreover be observed that in fecund women the mucus at the time of ovulation, and just before and after, tends to be plentiful, clear and with a good thread, in fact the character of the cervical mucus is a useful pointer to the imminence of ovulation It is of interest to note that the healthy cervical canal provides an environment in which sperms can survive after ejaculation at body temperature for longer than in any other known medium Vital processes are certainly involved, because good ovulatory cervical mucus extracted and placed in an incubator, in a damp chamber, ceases to afford a favourable environment to sperms, which in such extracted mucus lose motility many hours earlier than do those left in the mucus remaining in the cervical canal Immotile but histologically well-preserved sperms can be found up to twelve days after coitus in normal mucus

Findings relating to the Male

Regardless of the percentage of abnormal forms in the husband's semen it is rare to find more than 10 per cent of abnormal sperms in stained films of cervical mucus, most of those present being forms capable of active movement (e g sperms with pear shaped or tapering heads and microsperms) From this it may reasonably be assumed that most of the sperms found in cervical mucus get there by virtue of their own motility The degree to which the male partner is responsible for a ' bad" post coital result (i e sperms absent, or few or immotile) can, as already stated, be assessed only by a detailed analysis of his seminal fluid, and by the case history and clinical examinations (see page 25) There is some correlation, however, between the husband's sperm count and the basic motility and viability of his sperms as demonstrated in the seminal analysis and the result of post coital tests on the wife For example, in a series of 600 such tests (some of them repeated many times in the same case), carried out on various days in the cycle and at various intervals after coitus in cases in which the husband s semen had been

examined, it was found that where the sperm count lay between zero and 1 million per c c nearly 90 per cent of the post coital tests, as far as cervical mucus was concerned, were completely negative (i e no sperms found, motile or immotile) Where the count was between 1 5 and 20 million per c c about 65 per cent of the tests were negative, but where the count was over 20 million per c c the number of negative results fell to only 20 per cent In only about 1 per cent of the women in this last group were the post coital tests invariably negative, in the rest positive tests were obtained on one or more occasions In other words, where the seminal analysis is reasonably good one should expect, provided one looks diligently and often enough, to find sperms in the cervical mucus up to forty hours after coitus Cases in which no sperms can ever be found in the cervical mucus, in spite of adequate semen in the husband and apparently satisfactory coital technique, are rather rare and present an interesting problem, they can only be detected by repeated post coital tests

Findings relating to the Female

The post coital examination of films from the vagina and cervix, in addition to establishing the presence or absence and the condition of sperms in the female lower reproductive tract, provides information about the woman herself and her share in the infertility of the mating

The Vaginal Film ——Evidence of hyperœstrinization (unopposed action of œstrogens) may be shown in the vaginal film by the presence of excessive desquamation of epithelial squames, both cornified and uncornified, by numerous Doderlein bacilli (Grade I or II Flora) and marked acidity, and it is where such conditions exist that monilia may flourish in the vagina

Lowered ovarian activity is manifested in the film by a lack of the normal complement of cornified epithelial squames and an excess of cells from the basal layers of the vaginal mucosa, by a profusion of pus cells, a Grade III flora (diphtheroids, small bacilli and cocci but no Doderlein bacilli) and reduced acidity

A type of vaginal film met with rather commonly in infecund women is one in which there are plenty of squames with small pyknotic nuclei, a fair number of pus cells, and a profusion of small bacilli and cocci often completely covering and obscuring the outline of the epithelial cells It is in these two last types that *Trichomonas vaginalis*

may commonly be found, but it is not at all clear that its presence has, in itself any bearing on fertility

Cervical Mucus ——In the cervical mucus it is possible to distinguish various types of unsatisfactory or hostile secretion There are women who never produce plentiful, free flowing, clear mucus at any time of the cycle (even in the ovulatory phase) and whose mucus remains scanty throughout This class can be further subdivided into those with invariably scanty but fairly clear and untenacious mucus, and those in which the mucus is invariably scanty, opaque, cellular and extremely tenacious On the other hand, there are cases in which the mucus is plentiful in the mid cycle but gelatinous or frankly tenacious and packed with cellular elements (polymorphs, lymphocytes and cells from the cervical mucosa), and finally those rare cases in which the mucus, both microscopically and macroscopically, appears satisfactory in every way and yet can be shown *in vivo* and *in vitro* to be lethal to sperms of good viability

pH of Cervical Mucus ——It is not possible to make any dogmatic statement about variations in the *p*H of cervical mucus in relation to degree of fertility, nor has any definite correlation been found between the character of the mucus and its *p*H But there is no doubt that the reaction of cervical mucus at all times in the cycle tends to be on the alkaline side The change over at the external os from the normally acid reaction of the vagina (range 4 3–6 5) to the alkaline reaction of the cervical canal (range 7 0–8 6) is almost as clear cut, though not so great, as the difference in reaction on either side of the pylorus between the gastric and duodenal secretions

The bearing of this remarkable difference in reaction on the ascent of sperms in the female genital tract is uncertain, but it has been held by some authorities that the alkalinity of cervical mucus is an important factor in the attraction of sperms deposited in the vagina up into the cervical canal

Ætiology of Cervical Mucus Hostility

In the light of present experience it is not possible to state that the findings of any one of the above types of mucus in the presumptive ovulatory phase necessarily implies that conception cannot take place but it is probably safe to say that women who tend repeatedly to exhibit such types of mucus are liable to have great difficulty in conceiving and are only likely to do so if the nature

of their cervical mucus can be changed or if their husbands are exceptionally fertile

The precise ætiology of these hostile cervical plugs is still far from clear but the results of treatment suggest that infection, failure to ovulate regularly, endocrine imbalance (e g hyperthyroidism), chronic pelvic congestion and uterine hypoplasia all play a part, either together or separately How far the general metabolic state, including factors affecting general health, diet and in particular vitamin intake, bear on this subject is still quite uncertain Much research into the bacteriology and the biochemistry of the cervical secretion will be needed before the solution is found In passing, the well known fact may be recalled that conception can and does often take place in the presence of a purulent cervical plug and a non specifically infected cervical canal, as also when there is a heavy infection with the gonococcus It may also be stated that there is no satisfactory evidence that occlusive caps, con doms, or properly tested spermicides have any injurious effect on the cervix or vagina or that they induce sterility This cannot be said of the "gold pin" and Grafenberg ring which may produce considerable damage (see page 185)

A word should be added about women who have been deprived of their cervical mucus by the complete amputation of the cervix or extensive conization These surgical procedures are generally effective for the treatment of mucopurulent discharge, but if thoroughly carried out, they deprive the woman of her mucus producing cervical cells and may thus very seriously impair her fertility True, the subjects are usually multiparous women who may have no further interest in child bearing, but in women who still hope for offspring the results, as far as fertility is concerned, are anything but satisfactory In fact, the chances of concep tion after all the cervical mucosa has been removed are very slender

Findings and Case Histories

When the findings in post coital tests are examined certain fairly well defined types emerge

(1) The normal fertile response (outlined in Table 2 and illustrated by the first case), in which sperms are found in the vagina up to about eighteen hours after coitus and in which, about ovulation time, plenty of progressively motile sperms are found in good free flowing, clear mucus up to forty hours or more after coitus At other times in the

cycle, although sperms are found in the cervix, they may not be motile This type of response may, of course, be found in infertile couples, and in such cases the cause of the infertility has to be sought elsewhere, e g tubal abnormalities

(a) *Normally fertile couple, with receptive mucus in ovulatory phase and perfectly adequate semen*

Mrs H, aged 25, was married for a year during which time she had used contraceptives In May 1946 she abandoned these and by August had conceived (L M P on August 10th, 1946) The medical history was uneventful Menstruation started at 13½, and the periods lasted 3–4 days in a 26 day cycle Pelvic examination was normal Between May and August she very kindly submitted to three post coital examinations which illus trate well the sort of results that may be expected in fertile couples and the influence of the phase of the cycle on the character of the cervical mucus and survival of sperms The first test was carried out on the 22nd day of the cycle, 7 days after coitus, no sperms were found in the vagina but large numbers all immotile were present in the cervical mucus which was scanty and tenacious The second test was carried out on the 18th day of the cycle, 42 hours after coitus, again no sperms were found in the vagina, but masses, also immotile, were present in the cervical mucus which was scanty and slightly tenacious The third test was on the 10th day of the cycle, 16 hours after coitus, sperms were easily found in the vaginal film and masses were present in the cervical mucus which was plentiful, clear and free flowing More than 50 per cent of these sperms were motile many progressively so Seminal analysis (repeated several times) gave the following findings a count of 80–180 million per c c, 10 per cent abnormal heads, and good basic motility and viability

(b) *Good receptive mucus severe tubal stenosis perfectly adequate semen*

Mrs S, aged 30 and married for 8 years had not used contraceptives for 7 years but without achieving pregnancy She had had pleurisy soon after marriage and more recently several attacks of colitis' Menstruation started at 15 and periods lasted 5 days in a 28 day cycle Pelvic examination revealed a cervical erosion, and tubal insufflation demonstrated severe tubal stenosis with complete absence of normal fluctua tions (confirmed by a second test) In a post coital test on the 11th day of the cycle and 40 hours after coitus no sperms were found in the vagina but large numbers were present in the cervical mucus which was plentiful clear and runny More than 50 per cent of the sperms were motile many progressively so Seminal analysis gave the following findings a count of 380 million per c c, 8 per cent abnormal heads, and excellent basic motility and viability

(2) Cases in which few sperms are found in the vagina or cervix, though of those in the cervical canal a fair proportion are motile, some progressively so In these cases there is usually a good ovulatory mucus The fault commonly lies in the husband, suggesting a partially inadequate semen

(a) *Good receptive mucus moderate seminal inadequacy with reduced sperm count and poor viability*

Mrs C, aged 36 and married 7 years, had not used contraceptives for 6½ years She had had one doubtful miscarriage at the age of 34 The medical histories of wife and husband were uneventful Menstruation started at 12 and the periods lasted 3–4 days in a 26/30 day cycle Pelvic examination and tubal insufflation yielded normal findings The first post coital test was carried out on the 21st day of the cycle, 19 hours after coitus No sperms were found in the vagina, but in the cervical mucus, which was rather scanty and tenacious a fair number were present and one was seen moving sluggishly The second test was on the 12th day of the cycle, 14 hours after coitus A few sperms were found both in the vagina and the cervix, and in the cervical mucus which was plentiful, clear and runny, two sperms were found moving both progressively A third test on the 14th day of the cycle, 6 hours after coitus, showed plenty of sperms in the vagina a fair number in the cervical mucus, which was plentiful and runny but only a few moving in the cervix three progressively Seminal analysis (repeated once) gave the following findings a count of 50–60 million per c c, an average of 20 per cent abnormal heads, poor basic motility and very poor viability

(b) *Mild uterine hypoplasia adequate ovulatory mucus sperm count much reduced good motility and viability of sperms*

Mrs M, aged 30½ and married 5 years had not used contraceptives for 3½ years yet failed to conceive Her history was uneventful Menstruation started at 15½ and the periods lasted 4–6 days in a 26/27 day cycle Her husband had had mumps with orchitis at the age of 17 Pelvic examination revealed a half retroverted, somewhat hypoplastic uterus Two insufflations were carried out of which the first showed tubal occlusion due to spasm, and the second showed patent and peristaltic tubes In a post coital test on the 22nd day of the cycle, 8½ hours after coitus, 6 sperms were found in the cervical mucus one moving sluggishly The mucus was somewhat scanty and tenacious Another test on the 18th day of the cycle, 80 hours after coitus, showed a fair number of sperms, one of which was motile in the cervical mucus The mucus was somewhat scanty and tenacious A third test on the 15th day of the cycle 28 hours after coitus, showed in the cervical mucus which was clear and free flowing, a fair number of

sperms, about 25 per cent of which were motile, two or three progressively Seminal analysis (repeated several times) gave the following findings a count of 3–10 million per c c , 25 per cent abnormal heads, and good basic motility and viability

(3) Cases in which sperms are found readily enough in the vagina and cervical mucus, but in which, even at short intervals after coitus, the sperms are usually immotile (with possibly a few oscillating forms) in the cervical canal The female secretions may or may not appear normal This type of response suggests poor viability of sperms and/or marked cervical hostility

(a) *Endocrine imbalance, marked cervical hostility adequate semen*

Mrs R , aged 34 and married 11½ years, had failed to conceive after trying for 9 years The medical histories of wife and husband were uneventful Menstruation started at 12 and the periods lasted 6–7 days in a 28 day cycle She was stout and rather cyanotic Pelvic examination yielded normal findings Tubal insufflation showed apparent bilateral tubal occlusion, which was later confirmed by uterosalpingogram A post coital test on the 16th day of the cycle, 80 hours after coitus, showed a fair number of immotile sperms in the cervical mucus which was somewhat scanty and cloudy A second test on the 14th day of the cycle, 1½ hours after coitus, showed masses of sperms in the vagina and cervix but all immotile The cervical mucus was not typically ovulatory, being both scanty and cloudy Seminal analysis gave the following findings a count of 140 million per c c , 20 per cent abnormal heads, and good basic motility and very fair viability

(b) *Fair ovulatory mucus good sperm count low motility and viability*

Mrs G , aged 31 years and married 8 years, had failed to conceive in spite of never using contraceptives The medical histories were uneventful except that the husband s sexual performance was subnormal, coitus was infrequent and erections tended to fade Menstruation started at 12 and the periods lasted 4 days in a 27/29 day cycle Pelvic examination and tubal insufflation yielded normal findings A post coital test on the 10th day of the cycle 13 hours after coitus showed a fair number of sperms in the vagina and cervix A few were seen moving sluggishly (not progressing) in the cervical mucus, which was moderately clear and runny In a second test on the 10th day of the cycle, 12½ hours after coitus plenty of sperms were found in both the vagina and the cervix but only a few were seen oscillating after warming the slide The mucus was moderately clear and slightly tenacious Seminal analysis

gave the following findings a count of 175 million per c c, 20 per cent abnormal heads, and poor basic motility and viability

(4) Cases in which sperms are found in the vagina and cervix only at short intervals after coitus, or in which, at rather longer intervals, they can be found in the vagina but not at all in the cervix, or can be found in the cervix after prolonged search This suggests oligozoospermia, teratozoospermia, poor viability of sperms and/or extreme cervical hostility

(a) *Uterine hypoplasia marked cervical hostility slight coital difficulty perfectly adequate semen*

Mrs G, aged 37 and married for 10 years, after practising withdrawal for the first 3 years had thereafter tried unsuccessfully to conceive Apart from some coital difficulty, the medical histories were uneventful Menstruation started at 15 and the periods lasted 3 days in a 28-day cycle Pelvic examination revealed a markedly hypoplastic uterus with a long conical cervix, there was considerable vaginal spasm Tubal insufflation was attended by extreme spasm of the fallopian tubes but a utero-salpingogram showed that there was no organic obstruction Ten post-coital tests were carried out (mostly round about the date of ovulation) at various intervals after coitus, ranging from 1 hour to 40 hours The cervical mucus was invariably scanty cellular and tenacious Sperms were always present in the vagina up to 20 hours after coitus but were only found twice in the cervix, once 5 hours (immotile) and once 1 hour (motile) after coitus Seminal analysis (repeated several times) gave the following findings a count of 80–250 million per c.c, an average of 18 per cent abnormal heads, and good basic motility and viability

(b) *Cervical erosion and infection with some hostility of mucus moderate sperm count poor viability*

Mrs T aged 26, had been married 3½ years and had not used contraceptives She had one doubtful early miscarriage one year after marriage The medical history was uneventful and there was no coital difficulty Menstruation started at 14 and the periods lasted 7 days in a 30-day cycle Pelvic examination revealed a somewhat bulky, half retroverted uterus and a cervical erosion The findings on tubal insufflation were normal The post coital test was repeated 12 times at intervals ranging from 2½ to 63 hours after coitus and on various days of the cycle In the ovulatory phase the cervical mucus was usually plentiful, but cellular and moderately tenacious Sperms were found with great difficulty in the vagina and not at all in the cervix except on two occasions when the post coital intervals

were very short (3 and 2½ hours) On those occasions sperms were plentiful both in the vagina and in the cervix and were motile in the latter Seminal analysis (repeated several times) gave the following findings a count of 22–65 million per c c, an average of 16 per cent abnormal heads, fair basic motility but very poor viability

(c) *Mild uterine hypoplasia, scanty mucus, marked oligozoospermia and some teratozoospermia*

Mrs S, aged 23 and married 2 years, had used contraceptives for only the first 6 months but thereafter failed to conceive Both husband and wife were born abroad and he had had mumps at the age of 15 or 16 years with a mild orchitis There was no coital difficulty Menstruation started at 13½ and the periods lasted 3–4 days in a 24/25-day cycle On pelvic examination the uterus was found to be cochleate and hypoplastic A tubal insufflation performed elsewhere was reported as normal Six post coital tests were carried out at various intervals after coitus ranging from 12 to 60 hours, on various days of the cycle The cervical mucus was invariably scanty, though somewhat clearer and less tenacious between the 7th and 10th days of the cycle than at other times One sperm was found on one occasion in the cervical mucus Not one was ever found in the vagina Seminal analysis (repeated several times) gave the following findings a count of ½–3 million per c c, an average of 38 per cent abnormal heads, and fair basic motility and viability of the few sperms present

(d) *No obvious abnormality in wife adequate mucus, low sperm count extreme teratozoospermia*

Mrs B, aged 30 and married for 6 years, had tried to conceive for 2½ years without success The medical histories of wife and husband were uneventful Menstruation started at 15 and the periods lasted 6–7 days in a 28/30 day cycle Pelvic examination and tubal insufflation yielded normal findings Four post coital tests were carried out at intervals after coitus ranging from 5 hours to 40 hours, at various times in the cycle There was good ovulatory mucus near the time of ovulation No whole sperms were ever found in the vagina or cervix except at the 5 hour interval when a few immotile sperms were detected in both situations Seminal analysis (repeated several times) gave the following findings a count of 5–20 million per c c, an average of 80 per cent abnormal heads, and extremely poor basic motility and viability

(5) Cases in which prolonged search fails to reveal sperms either in the vagina or cervix even at short intervals after coitus This suggests either azoospermia, impotence, failure to ejaculate, or extreme vaginismus

(a) *Mild uterine hypoplasia menstrual irregularity, adequate mucus perfectly adequate semen failure to ejaculate although penetration occurred*

Mrs N aged 32 and married 8 years, after coitus interruptus for several years had been trying to conceive for at least 2 years without success The medical histories of wife and husband were uneventful Menstruation started at 15½ and the periods lasted 5 days in a 28-day cycle, but in the last 3 months the losses had been prolonged and irregular Pelvic examination revealed a somewhat hypoplastic, cochleate uterus, the cervix appeared healthy Tubal insufflation yielded normal findings Post coital tests were carried out on three occasions, at intervals ranging from 6 to 18 hours after coitus round about ovulation date, but sperms were never found in the vagina or cervix, although there was plenty of clear runny mucus The patient insisted that penetration occurred but was uncertain herself whether ejaculation took place the husband, as quite often happens in these cases, was under the impression that it did Seminal analysis (repeated several times) gave the following findings a count of 120–305 million per c c , an average of 10 per cent abnormal heads, and excellent basic motility and viability

(b) *Uterine hypoplasia trichomonal vaginitis extreme vaginismus and failure to penetrate moderately adequate semen*

Mrs K., aged 33, had been married 8½ years without conceiving Coitus had never been successful, notwithstanding this contraceptives had been used for the first 6 years of marriage The medical histories of wife and husband were uneventful Menstruation started at 13½ and the periods lasted 3–4 days in a 26 day cycle Pelvic examination revealed extreme vaginismus and a hypoplastic cochleate uterus *Trichimonas vaginalis* was present in the vaginal films Tubal insufflation showed extreme spasticity of the tubes but utero-salpingography showed these to be patent Four post coital tests were carried out at various intervals after coitus ranging from 6 to 40 hours on various days in the cycle, but sperms were never found in the vagina or cervix although a good ovulatory mucus was present Seminal analysis (repeated several times) gave the following findings a count of 15–80 million per c c an average of 25 per cent abnormal heads and fair basic motility and viability

(c) *Cervical erosion and infection complete azoospermia*

Mrs C, aged 29 and married 5½ years had used contraceptives for the first 4 years but thereafter failed to conceive She had had a partial thyroidectomy for mild Graves s disease just before marriage Her husband s medical history was uneventful and there was no coital difficulty Menstruation started at 15 and the periods lasted 6–7 days in a 28 day cycle Pelvic examination revealed a large cervical erosion Tubal insufflation yielded normal findings Three post coital tests were carried

were very short (3 and 2½ hours) On those occasions sperms were plentiful both in the vagina and in the cervix and were motile in the latter Seminal analysis (repeated several times) gave the following findings a count of 22–65 million per c c, an average of 16 per cent abnormal heads, fair basic motility but very poor viability

(c) *Mild uterine hypoplasia scanty mucus, marked oligozoospermia and some teratozoospermia*

Mrs S, aged 23 and married 2 years, had used contraceptives for only the first 6 months but thereafter failed to conceive Both husband and wife were born abroad and he had had mumps at the age of 15 or 16 years with a mild orchitis There was no coital difficulty Menstruation started at 13½ and the periods lasted 3–4 days in a 24/25-day cycle On pelvic examination the uterus was found to be cochleate and hypoplastic A tubal insufflation performed elsewhere was reported as normal Six post coital tests were carried out at various intervals after coitus ranging from 12 to 60 hours, on various days of the cycle The cervical mucus was invariably scanty, though somewhat clearer and less tenacious between the 7th and 10th days of the cycle than at other times One sperm was found on one occasion in the cervical mucus Not one was ever found in the vagina Seminal analysis (repeated several times) gave the following findings a count of ½–3 million per c c, an average of 38 per cent abnormal heads, and fair basic motility and viability of the few sperms present

(d) *No obvious abnormality in wife adequate mucus low sperm count extreme teratozoospermia*

Mrs B, aged 30 and married for 6 years, had tried to conceive for 2½ years without success The medical histories of wife and husband were uneventful Menstruation started at 15 and the periods lasted 6–7 days in a 28/30 day cycle Pelvic examination and tubal insufflation yielded normal findings Four post coital tests were carried out at intervals after coitus ranging from 5 hours to 40 hours, at various times in the cycle There was good ovulatory mucus near the time of ovulation No whole sperms were ever found in the vagina or cervix except at the 5 hour interval when a few immotile sperms were detected in both situations Seminal analysis (repeated several times) gave the following findings a count of 5–20 million per c c, an average of 80 per cent abnormal heads, and extremely poor basic motility and viability

(5) Cases in which prolonged search fails to reveal sperms either in the vagina or cervix even at short intervals after coitus This suggests either azoospermia, impotence, failure to ejaculate, or extreme vaginismus

Douching with Milton's fluid (one part in three parts of warm water) is also effective, particularly if discharge is considerable and offensive Milton's fluid, or a modification of it, is commonly used in veterinary work for Trichomoniasis in the cow—and the writer has found it a valuable additional therapeutic agent in women infested with this irritating parasite, especially if the habits of the host are not particularly cleanly Milton's fluid (warm and undiluted) can also be used with benefit for washing out the bladder in those unfortunate cases where the parasite has penetrated to that viscus, and, where the husband is suspected or known to be carrying the Trichomonad in the urethra and/or bladder or under the foreskin and thus constantly reinfecting the wife during coitus, irrigation of the male urethra and bladder and washing the glans penis with Milton's fluid is indicated

Moniliasis ——Gentian violet is an effective remedy in this condition It may be applied as a 1 per cent aqueous solution to the vaginal walls or inserted in suppository form (gentian violet, glycerine and borax suppositories, B D H) every third night for three or four occasions Some patients are intolerant of more frequent or larger doses than this A rubber fingerstall can be used for its insertion to avoid staining the finger Alkaline douches also help to control the condition and to allay irritation

Chronic Pelvic Congestion associated with Retroversion, Chronic Constipation or Sedentary Habits ——The treatment comprises manipulation of the uterus and insertion of a Hodge pessary (or ventro suspension if these are not effective), postural exercises, and regulation of the bowels

Endocervicitis with or without Erosion ——The following measures are all of value but obviously the simpler ones should be tried first painting with Negatol, full strength, insertion of glycerine and ichthyol pessaries, light electric cauterization, administration of sulphonamides, 7–8 grams every 24 hours for 2–3 days, administration of penicillin, 100,000 units twice a day for 3 days, pelvic short-wave diathermy

Scanty Mucus associated with Hypoplasia and/or Ovarian Deficiency or Anovulatory Cycles ——The following measures are of established value

(*a*) Administration of œstrogens and progesterone or ethisterone by mouth, injection, or local application

By mouth —Stilbœstrol ($\frac{1}{2}$–2 mg daily for 12–16 days starting on the 4th day of menstruation) followed by

out at various intervals after coitus, ranging from 4 to 60 hours, and on various days in the cycle, but sperms were never found in the vagina or in the cervix The cervical mucus was plentiful and runny, but heavily loaded with leucocytes and mucus cells Seminal analysis (repeated once) showed complete azoospermia

Treatment

The *first essential is to assess, if possible, the relative* degree of responsibility of husband and wife, and to plan treatment accordingly If both the post coital test and the seminal analysis suggest that most or the whole of the responsibility falls on the male partner, treatment should follow the lines laid down in Chapter 4 On the other hand, if the infertility factors seem to lie mainly in the wife, *in her cervical canal or elsewhere, then treatment* must necessarily be directed towards her If both show faults, a joint and co-ordinated therapeutic plan will be needed, but precisely what forms the treatment should take and in what order it should be arranged will depend on the results of other examinations besides the post coital *test The only measures discussed in this section* are those that have an effect—direct or indirect—on the cervical canal or the vagina

Excessive Desquamation and Marked Acidity ——For these conditions, and as a general stimulus to the ascent of sperms, alkaline douching is of value The best time for this procedure is just before bedtime, and it should be adopted nightly, during the first half of the menstrual cycle after the period ceases

The following are suitable solutions 1 teaspoonful of sodium bicarbonate in 1 pint of warm water, 2 teaspoonfuls of Nutri Sal (Ortho Pharmaceuticals, Ltd) in ½ pint of warm water

Vaginal Spasm, awkwardly placed Cervix and Premature Ejaculation ——If any of these are present, instructions should be given on coital position and technique (see Chapters 2 and 4)

Trichomonas Infections ——These may be controlled, if not cured, by œstrogens given by mouth (e g stilbœstrol 0 5–1 mg daily) and/or locally in the form of a suppository (e g Kolpon Vaginal Tablets (Organon) containing 1,000 units of œstrone) in the first half of the cycle, followed in the second half by the nightly use of some form of vaginal suppository lethal to *Trichomonas vaginalis* The following are convenient preparations S V C Tablets (May and Baker), or Carbarsone Suppositories (Ely Lilly)

whether by reason of impotence, malformation of the penis, intractable vaginismus, or extreme displacement of the cervix, recourse may be had to direct or artificial insemination using the husband's semen (A I H) In theory this measure should also be of use, in conjunction with other forms of treatment, in cases in which there is cervical hostility and/or poor semen, but in practice A I H seems of little value in such cases, normal intercourse being just as or even more effective Any treatment given for such cases is best directed towards improving the quality of the mucus and/or of the seminal fluid

Finally, it should be realized that in some cases of the type that have been considered in this chapter it is not always easy to assess the extent to which endocrine imbalance, general ill health and faulty dietetics are responsible for the infertility, When such doubts exist it is obviously desirable, before finally embarking on a line of treatment, to seek the opinion of an endocrinologist or general physician

Ethisterone (5–15 mg daily for 8–10 days before the next period) Recently Ethinyl Œstradiol has become readily available This œstrogen is both more powerful orally and less toxic than Stilbœstrol and is therefore to be preferred in most cases—though, for reasons which are not yet clear, some women respond more favourably to Stilbœstrol or Dienœstrol The suggested dosage of Ethinyl Œstradiol is 0 025–0 05 mg daily for 12–16 days, starting on the 3rd or 4th day of menstruation Ethinyl Œstradiol may also be followed by Ethisterone in the dosages suggested above

By Injection —Œstradiol benzoate (25,000–50,000 International Units every three days for four doses starting on the fourth day of menstruation) followed by progesterone (5–10 mg every three days until the next period starts)

Locally —Kolpon vaginal tablets (see above) inserted vaginally *in the first half of the cycle*

(*b*) Dilatation and curettage

(*c*) Pelvic short-wave diathermy (two or three applications weekly for at least two months)

Of more doubtful value are

(*a*) Serum and chorionic gonadotrophins given by injection, as suggested by Hamblen and Davis (1945), e g Gestyl (Organon) 400 units daily, or every other day, for a period of 12 days starting on the fourth day of menstruation, followed by Pregnyl (Organon) 500 units daily or every other day for another 12 to 14 days

(*b*) Irradiation of pituitary or ovaries by small doses of X-rays This requires considerable skill and experience to avoid overdosage, and should not be lightly undertaken Excessive dosage would produce the reverse of the desired effect and result in an artificially induced menopause

Cases showing evidence of Hyperthyroidism ——For these suitable measures are rest and the administration of bromides, phenobarbitone, thiouricil, œstrogens, etc under proper medical supervision

Cases showing evidence of Hypothyroidism ——These call for the administration of thyroid extract in graded doses

General measures that may favourably influence the cervical and vaginal secretions include regulation of the diet, supplemented where necessary by additional vitamins, calcium and iron, and regulation of the patient s rest and exercise

In cases in which the semen is not deposited satisfactorily,

Fig 4 X ray showing apparent bilateral occlusion

Fig 5 Subsequent X ray showing normal patency

by means of the kymograph (Fig 6, facing page 67) which has the advantage of keeping, in the form of a tracing, a permanent record of what happens when the gas is passed into the uterus Various claims, some of which are as yet unproved, have been made for this instrument For example, it has been credited with the ability to differentiate between spasm and organic blockage, to reveal the presence or absence of tubal peristalsis, and to detect occlusion of one tube when the other is patent These claims have yet to stand the test of critical examination, and in the meantime it is wise to remember that kymographic tracings are subject to similar fallacies of interpretation as are insufflation tests with the more simple apparatus

Injection of Radio-opaque Substances

In 1914 Rubin and Carey were independently experimenting with the injection of radio-opaque materials into the uterine cavity It was found that substances such as lipiodol would outline the uterus and in most cases pass into the tubes and through them into the peritoneal cavity It was obvious that this provided a means by which tubal patency could be investigated, but it was not widely used until after the insufflation test was established some years later

In many cases it was found that one or both tubes would fail to outline, or the material would pass some distance along the tube and then be apparently arrested in its progress The obvious deduction was that the tube was blocked, and the new test was heralded as being more accurate than gas insufflation and as having the additional advantage that it would reveal the actual site of the block if one existed In the light of further experience, it can be said that when the tube outlines and a spill occurs into the peritoneal cavity then, without question, that tube is patent, but if the tube fails to outline, or does so without spill into the pelvic cavity, then one is not justified, on this evidence alone, in diagnosing blocked tubes Organic blockage may cause this failure to outline, but in many cases the occlusion is apparent rather than real, and is due to spasm as already described in the section dealing with gas insufflation In such cases the spasm can be relieved by the use of suitable spasmolytics, such as nitroglycerine, and it should be noted again that atropine is not usually effective for this purpose in severe cases As can be seen from Figs 4 and 5, spasm may affect both tubes simul

taneously, or it may affect one tube on one occasion and the opposite tube on another

The test is best performed under the fluorescent screen, for by this means the reaction of the uterus and the tubes can be studied more closely and only sufficient radio-opaque fluid need be injected to give the required information In a case in which the tubes are widely patent this will often prevent the deposit of an excess of lipiodol, or of similar material, in the pouch of Douglas At any stage of the examination, if a permanent record is required of the findings, a film can easily be taken and the screening then continued

With this technique it is not uncommon to observe an irritable uterus contracting violently and expelling its contents into the vagina with no filling of the tubes Lesser degrees of the same reaction are also common, and in these cases, if screening were not performed, the clue to the cause of the occlusion could easily be missed On other occasions, tubes which have failed to outline will be seen to fill in a normal way when the uterus, under vision with the fluorescent screen, is manipulated by movement of the inserted cannula or by traction on the volsellum A further advantage of the screening technique is that any extravasation of radio opaque material into the vascular channels can be detected at once and the danger of embolism thus reduced

Assessment of Findings

From the above discussion it can be seen that tubal patency can be diagnosed with certainty when gas passes through the tubes or when radio opaque material flows through them into the peritoneal cavity It cannot be emphasized too strongly, however, that tubal blockage due to disease is far more difficult to diagnose with accuracy owing to the high incidence of uterine and tubal spasm in irritable uteri If an error in diagnosis is made and a plastic operation is performed when spasm is the cause of the occlusion, then the chances of conception occurring later will be still further decreased

A working rule worthy of consideration is that when investigations for tubal patency, whether by gas insufflation or by the injection of radio opaque materials, fail to demonstrate patency even when spasmolytics are used, then before telling the patient that her tubes are blocked a further opinion should be obtained from someone more

Fig 6 Electric kymograph in action showing recording of apparently occluded tubes

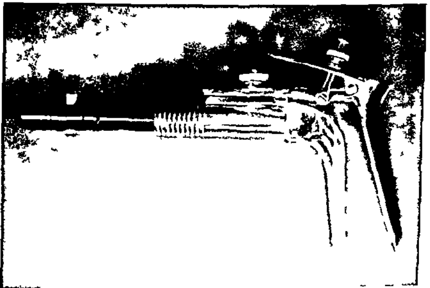


Fig 7 Illuminated bivalve speculum

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experienced in this work It is hoped that the projected development of medical services will include the establishment of clinics at which an opinion can be obtained in all regions throughout the country

Reassurance of the Patient

A patient advised to have her fertility investigated will naturally wonder just what is involved and may ask for further information on the subject A few minutes' explanation, helped out if necessary with a simple diagram, will convey sufficient information on the anatomy of the pelvic organs to enable most women to understand what is involved in the tests It should be pointed out that these tests are not usually painful, although in rare cases in which a woman is either unduly sensitive or has a tightly closed cervix, particularly if this is associated with an acute anteflexion, there may be severe discomfort Fortunately, these patients can usually be detected beforehand by ordinary careful pelvic examination, and most women when told that at a fertility clinic not more than five or ten women in every hundred demand an anæsthetic will decide for themselves that there can be little to worry about

At the time of the investigation it should be explained that when the sound or dilator is passed into the uterus there may be some slight discomfort such as is experienced at a menstrual period If a patient knows what to expect she forgets many of her fears It must be remembered that the gentleness and skill of the operator are the main factors controlling the amount of discomfort the patient has to endure She should also be told that the tests, whether by insufflation or lipiodol injection, take only a few minutes to perform and do not require admission to hospital If when lipiodol is used the tubes outline in part or in whole but without spill into the peritoneal cavity, then a further screening or film will be required some hours later by which time spill may have occurred This second examination is sometimes made twenty-four hours after the first and it is well to explain the reason for it beforehand to avoid misapprehension if the patient is asked to report back for a further picture

Insufflation or Utero-Salpingography?

The question is often raised as to which is the better method of investigation, insufflation or lipiodol injection The consensus of opinion among experienced workers is

that each method has certain advantages over the other but that, as a usual routine, it is advisable to use gas insufflation first This test is perhaps a little simpler to perform It does not require as elaborate an apparatus and for that reason is cheaper The radiological technique of screening under the fluoroscope, or taking serial films, has become safer with the use of water soluble radio opaque media in place of lipiodol and the other oily preparations which were originally used The new materials are less irritating to the tubes and the peritoneum and the danger of oil embolus is removed They are rapidly absorbed from the peritoneal cavity and are excreted in the urine Water soluble media commonly used in Great Britain are one of the proprietary preparations of diodone in a viscid medium Viskiosol is at present used in the Oxford Department

Technique of Insufflation and Utero-salpingography

These tests must be performed with scrupulous attention to aseptic technique This can be most readily maintained if the patient is in the lithotomy position, and if a table or couch suitably equipped for this is not available, it should be remembered that the Clover's crutch as used in midwifery practice can be employed An anæsthetic is rarely necessary, but when the patient is unduly sensitive or apprehensive a minimal dose of pentothal is useful If this is used for utero-salpingography it is the more important to adopt the screening technique and to have the patient nearly awake before the lipiodol is injected, so as to reduce the danger discussed later of producing a massive oil embolism

As a first step the pelvis is examined to confirm the position of the uterus so that the sound, and dilators if necessary, can be passed with a minimum of trauma and without danger of perforating the uterus This grave event is particularly liable to occur through the operator, having failed to make this preliminary examination, proceeding to pass the sound into a retroverted uterus as if it were in the anteverted position The chances are of course increased if the patient is anæsthetized

When the exact position of the uterus is determined the cervix is exposed with a suitable speculum If good lighting is not available a useful instrument is the illuminated bivalve speculum modified by the author (see Fig 7, facing page 67) [1] The anterior lip of the cervix is then gently grasped with a single toothed volsellum This usually causes

[1] *British Medical Journal* 1941 2 696

experienced in this work. It is hoped that the projected development of medical services will include the establishment of clinics at which an opinion can be obtained in all regions throughout the country.

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At the time of the investigation it should be explained that when the sound or dilator is passed into the uterus there may be some slight discomfort such as is experienced at a menstrual period. If a patient knows what to expect she forgets many of her fears. It must be remembered that the gentleness and skill of the operator are the main factors controlling the amount of discomfort the patient has to endure. She should also be told that the tests, whether by insufflation or lipiodol injection, take only a few minutes to perform and do not require admission to hospital. If when lipiodol is used the tubes outline in part or in whole but without spill into the peritoneal cavity, then a further screening or film will be required some hours later by which time spill may have occurred. This second examination is sometimes made twenty four hours after the first and it is well to explain the reason for it beforehand to avoid misapprehension if the patient is asked to report back for a further picture.

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even nausea and vomiting These sequelæ seldom occur when volumes of 100 c c or less of gas are used When they do occur they are of short duration when carbon dioxide gas is used because of its rapid absorption from the peritoneal cavity It should also be noted that they furnish supplementary proof of tubal patency If a permanent record is desired an X-ray film of the upper abdomen taken at this stage will show a subdiaphragmatic gas bubble

Dangers of Insufflation and Utero-salpingography

Gas insufflation and utero salpingography are easy to carry out, but it is well to remember that they are not free from risk, particularly of infection and embolism The exercise of due care, however, reduces the chances of these grave complications to a minimum

Infection

This may be introduced from without if aseptic pre cautions are not scrupulously observed, or infection already present in the cervix, endometrium or tubes may be spread by the manipulations The result may be a severe and generalized peritonitis For this reason neither insufflation nor lipiodol injection should be performed on any patient whose cervix is infected or who has any vaginal infection A clean cervical erosion, that is to say one which is not associated with a muco purulent discharge, is not a contra-indication to the test, but if there is any doubt in a given case the cervical erosion should be treated first (see page 94) or a second opinion should be obtained

Embolism

Either gas or oil embolism can occur and many examples of both may be found in the literature None the less, if neither insufflation nor utero salpingography is performed on the eve of a period, or during the week following a period, or immediately after a curettage or biopsy has been performed, *then the risk of embolism is very slight* In spite of a wide experience of these procedures the author has not yet seen a case

It is thus evident that these tests should be performed only at a carefully selected time in the menstrual cycle, and from this it follows that an appointment should be made beforehand either with the hospital clinic or the specialist who is to perform the tests An inquiry must be made as to the date of the first day of the last period and

no discomfort, but when it does the pain tends to be midline hypogastric in site and is probably caused by uterine spasm One should be doubly careful of diagnosing organically blocked tubes in such cases The exposed cervix is washed with aqueous flavine or biniodide and a sterile uterine sound is passed to measure the length of the cavity This measurement is recorded in the notes If the sound passes easily dilators will not be necessary, but if the os is closed dilators to the size of a number 4 Hegar are used The cannula is then inserted Two useful types are those illustrated in Fig 8 The screw type has the advantage that no volsellum is necessary but it causes greater trauma to the cervix than the other None the less in most unanæsthetized patients it can be screwed into place without causing distress

With both types it is advisable, for utero salpingography, to use a metal adaptor, so that the syringe by which the material is injected can be fitted directly Rubber connections are very liable to slip and become soaked in the greasy material, and when this happens it is difficult to re-attach them firmly until the whole apparatus has been cleansed and re-sterilized The delay thus necessitated is appreciated by neither the patient nor the X ray department Incidentally, in a busy department co operation for this type of examination is most easily obtained if the cannula is inserted before taking the patient into the screening room The examination then requires only a few minutes

Before insufflation is performed a useful tip, once the cannula has been inserted, is to fill the vagina with a fluid such as weak dettol solution Any escape of gas round the cannula is then immediately detected by its bubbling through the fluid The gas should be injected slowly (40–60 c c per minute) and to a pressure not greater than 200 mm of mercury Sudden injection is dangerous, for it may induce too high a pressure with possible rupture of a blocked tube and even dissemination of infected material from the tube into the peritoneal cavity Moreover, apart from the danger of rupture the sudden distension of the uterus and tubes causes pain, and spasm may result When the tubes are patent this fact may be confirmed by auscultation If a stethoscope is placed over either iliac fossa the bubbling of the gas into the peritoneal cavity can be heard When the patient sits up after the insufflation the gas which has entered the peritoneal cavity tends to collect under the diaphragm and may cause referred pain in the shoulder and

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Causes of Tubal Spasm

The question naturally arises, why a healthy woman with an apparently healthy pelvis should have blocked tubes Or why a woman whose tubes appear to be blocked after careful and repeated examinations may still on occasions conceive Or why a woman whose pelvis is healthy, whose tests are all satisfactory, who lives a normal life with a healthy and fertile husband, fails to conceive, yet does so shortly after adopting a child

All such cases can be satisfactorily explained by the recognition of spasm of the uterus, the tubes, or both The irritable uterus is as much a clinical entity in the fertility clinic as it is in the labour ward The irritability may be induced in the course of the investigation, in which case tubal occlusion may be diagnosed incorrectly, or it may be a more permanent state and itself be a major factor in causing sterility This is most likely to occur in the nervous, highly strung, emotional type of woman who may have other manifestations of autonomic instability Spasmodic dysmenorrhœa, recurrent abdominal pain due to colonic spasm, or renal pain due to pelvi ureteric spasm are but a few of the ways in which this instability may be shown These patients frequently resent pelvic examinations and complain of pain when the cervix or uterus is palpated or moved even though the pelvis is in fact free of organic disease Holding the cervix with a volsellum causes severe hypogastric pain and the passage of a sound may be followed by either fainting or vomiting The injection of lipiodol reveals the typical picture of the irritable uterus, already described and illustrated in Fig 4 Much more research work has yet to be done on this important, but as yet unexplored, aspect of infertility

Causes of Tubal Block

Organically blocked tubes are usually the result of previous inflammatory disease, but on rare occasions absence of one or both tubes may occur as a developmental defect The tube is by far the narrowest portion of the female reproductive tract and it is not uncommonly the site of inflammation which may arise either from within the tract or from without, causing salpingitis It is not surprising therefore that following salpingitis the lumen is sometimes obliterated, in fact the surprising thing is that this does not happen more often Of the infections arising within the reproductive tract, those most commonly followed by tubal

the length of the usual menstrual cycle, and with this information an appointment can be given for a day on which the tests can be performed with the maximum safety Ten to fourteen days before a period is due is a safe time to choose As a further precaution, before the tests are per formed, it is wise to ask again the date of the last period or even better the date when the next one is expected This information should also be recorded on the patient's notes

It will be seen from the above that the test is performed at, or just after, the expected time of ovulation, and when desired the post coital test, tubal insufflation, and the taking of an endometrial biopsy can all be arranged in that order for the one appointment This combination of investi gations has been used for several years at the Oxford Fer tility Clinic, and elsewhere, with economy of effort and satisfaction to all concerned

Statistical Findings

Sharman in a study of a consecutive and unselected series of 500 cases of primary sterility at Glasgow found that insufflation revealed apparent non patency in 38 per cent, and in a series of 1063 he believed that "true non patency" existed in 25 to 30 per cent In his view there is little difference in the results whether insufflation or lipiodol injection is used [1] Green-Armytage in London states that complete tubal blockage occurs in about 29 per cent of all cases but in only 14 per cent of patients with primary sterility The suggestion is that post abortal or post partum sepsis is responsible for much tubal damage and hence for much acquired sterility Moore White, also of London, in a series of 928 patients found tubal occlusion in 20 per cent At the Exeter Clinic, Margaret Jackson found tubal abnormalities (partial or complete occlusion and/or absence of peristalsis) in about 30 per cent of some 900 cases of primary and secondary sterility, but rather fewer than 10 per cent showed complete organic occlusion on further examination Stallworthy at Oxford found apparent occlu- sion in 22 per cent of a series of 752 consecutive patients, but subsequent tests with the use of spasmolytics reduced this figure to 14 per cent and there was evidence to suggest that even this low figure was too high and due to an un- determined incidence of "irritable uteri" with associated unrelieved spasm

[1] Since this was written Sharman (1947) in a subsequent publication has stated that in his latest series the incidence of non patency was 20 5 per cent and he believes that this very closely represents the correct figure

in spite of pelvic activity there may be no rise of temperature and no disturbance of the sedimentation rate In these cases, even when the adnexæ are clinically normal, the tubes are most probably involved in a silent tuberculous salpingitis and are usually, but not always, blocked Sharman found an incidence of unsuspected tuberculous endometritis of 5 3 per cent in over 800 patients complaining of a primary sterility, and in 750 patients attending the Oxford Fertility Clinic there was an incidence of 3 per cent At Exeter the incidence was about 2 per cent

These are cases of unsuspected tuberculosis, but in view of the importance of this infection in relation to sterility it should be remembered that the total incidence is probably greater than that already recorded Any woman complaining of sterility should be suspected of having a tuberculous infection if in the absence of any history of pelvic sepsis she is found to have unilateral or bilateral tubal thickening Contrary to the usual teaching on this subject there is now ample evidence that a woman may have extensive tuberculous disease in her pelvis but still retain a normal menstrual cycle In fact amenorrhœa occurred in less than 20 per cent of the patients attending the Oxford Clinic with this disease Fifty per cent had normal periods and the remainder had either marked irregularity or menorrhagia In the Oxford series no patient with a proved lesion has conceived, but extra uterine pregnancy has been found in tubes which were the site of healed tuberculous lesions

Treatment of Tubal Occlusion

Little is yet known for certain about the treatment of occlusion due to spasm, but investigations now in progress should do much to clarify the position in the near future The major question to be decided is whether, in a particular case, the spasm is initiated by the manipulations attending insufflation or utero salpingography, or whether it is a manifestation of a uterine irritability which is itself the factor interfering with the normal functioning of the organ and hence responsible for the infertility The latter state of affairs implies the existence of an autonomic instability in which anxiety or emotional stress could be the exciting cause of the uterine or tubal irritation Even a great desire to conceive may in this way destroy the chance of its own fulfilment When this occurs the adoption of a child may, as already suggested (see page 73), alter

blockage are gonorrhœa, post abortal, and puerperal infections, and the two last are the commonest causes of acquired sterility following a pregnancy None the less, it should be remembered that severe and widespread pelvic sepsis may, and usually does, resolve completely, leaving a healthy uterus with patent and physiologically normal tubes With the advent of chemotherapy and its progressively wider use in clinical medicine the incidence of complete recovery will increase

Acute appendicitis with peritonitis or pelvic abscess formation may leave disorganized and blocked tubes, as may also pneumococcal or tuberculous peritonitis Any of these conditions may occur long before puberty and permanently damage the tubes in the early years of life As the original infection may not have given rise to an acute emergency but merely to a period of ill health, it not uncommonly happens that examination and possibly operation in later years reveals tubes which are disorganized and blocked even though there is no definite history of any pelvic infection On the other hand, it should be remembered that many patients complaining of sterility are found to have patent tubes in spite of the fact that they have had a previous serious peritoneal infection

The importance of pelvic tuberculosis as a cause of tubal occlusion has been recognized only in the last few years and there is evidence to suggest that it is the most important of all pelvic infections in this respect It has been found that women who appear to be perfectly well, who have no personal or family history of tuberculous infection, whose menstrual history is normal in every way, may none the less have an active tuberculous endometritis The report of the pathologist on a biopsy specimen of endometrium is often the first evidence that tuberculosis is present in the pelvis

At this stage it must be emphasized that a diagnosis and prognosis must not be based on one specimen of endometrium If tuberculosis is suspected the biopsy should be repeated and, as described in the following chapter, the endometrium should be cultured as well as examined histologically In normal endometrium it is not uncommon to see aggregates of lymphoid tissue which may easily deceive the inexperienced pathologist into believing that he is dealing with a tuberculous infection Many patients with proved active tuberculous endometritis appear on examination to have no focus of infection elsewhere, and

a mechanical block preventing the sperms from meeting the ovum but usually the muscular wall of the tube has been damaged by the disease responsible for the blockage On occasions, however, it happens that only the fimbrial end is occluded by filmy adhesions while the remainder of the tube is healthy This type of occlusion is well demonstrated by a characteristic utero-salpingogram in which the tubes outline with a bulbous extremity at the ampullary end with no spill into the peritoneal cavity

When tubes are organically blocked there is no hope of conception unless their patency can be restored, and for this the safest way is by plastic surgery The alternative method of trying to free adhesions by insufflating at a high pressure should not be used, for it involves the risk of rupturing the tube The decision to operate in a given case should not be made lightly and should be the responsibility of a gynæcologist experienced in this type of work He should be guided in his decision by the nature of the old infection, when this is known, by the site of the blockage, and by the absence of any evidence of recent inflammation at the time of operation In the light of the data recorded earlier (see page 74) on the incidence of endometrial and tubal tuberculosis in these cases, it is the more important to make certain that there is no active lesion present before advising operation An essential safeguard is to have the endometrium examined by a competent pathologist before a laparotomy is performed It should be noted, however, that a negative endometrial biopsy does not exclude the possibility of tubal tuberculosis being present

The prognosis for pregnancy is bad when active uterine or tubal tuberculosis is present It is equally bad when tubes have been disorganized by a former lesion now quiescent In the presence of activity the choice of immediate treatment lies between a sanatorium routine, radical surgery, or irradiation of the pelvis The choice is not an easy one to make If the patient is in the late thirties and has no active lesion elsewhere, there is much to commend a radical clearing of the pelvis by total hysterectomy with bilateral removal of the adnexæ This should be followed by an adequate holiday after which the patient may adopt a child without fear of a spreading infection

In younger women the attitude should be more conservative For example, in 22 patients with endometrial tuberculosis observed at the Oxford Fertility Clinic 18 have remained well with no apparent spread of the disease One

the whole picture With the cessation of mental conflict following a satisfying adoption, the stimuli provoking the uterus cease, it becomes more normal in its activity and pregnancy may follow For this reason it is obvious that when adoption is advised in these cases the patient and her husband should understand that they must be prepared for the subsequent arrival of a child of their own

As the very existence of the "irritable uterus" is at present under examination, and as this conception of its influence on fertility is new, it follows that the best method of treatment has probably still to be discovered It will be equally clear that adoption is not a method which will commend itself widely to men and women who are anxious to produce a child of their own The rational method of treatment would be to relieve the spasm, and much work has still to be done to discover the ætiology of this condition before therapeutic measures can be firmly established In the meantime it is recommended that the patient should take spasmolytics such as nitroglycerine grain $\frac{1}{100}$ or pethidine 50 mg before retiring on the days of the fertile period Intercourse should if possible be confined to these days in each month during the course of treatment, for this would give the best chance of conception In severe and intractable cases relief of uterine spasm can be secured by surgical means, either by alcohol injection of the pelvic plexus near to the ampulla of the rectum, or by presacral neurectomy These procedures should not be adopted lightly and should be performed only by a gynæcologist skilled in their technique

In many patients uterine irritability is associated with varying degrees of genital hypofunction This may be manifest by a late onset of puberty, scanty periods with typical hygogastric dysmenorrhœa, and infertility In such cases the correct treatment is to give œstrogenic hormones intermittently, or to use a combination of œstrogenic hormone and progesterone, with or without pelvic diathermy, as described on page 61 Treatment of genital hypofunction should be both advised and supervised by a gynæcological specialist The reason for this is that the condition is not always easy to recognize in its milder forms and the injudicious use of œstrogenic hormones can be followed by irregular, and sometimes excessive, bleeding

Prognosis in Tubal Occlusion

In tubal occlusion due to organic blockage of the tubes (see page 73) the prognosis is not good Not only is there

CHAPTER SEVEN

OVULATION AND THE ENDOCRINE BALANCE

In the act of conception the two principal players are the ovum and the sperm It follows therefore, as stated in the introductory comments (see page 7), that one of the prerequisites for conception is that ovulation, or the shedding of an ovum, must occur Partly because Nature is profligate in the number of sperms produced, but largely because seminal fluid is relatively easily obtained for examination, there is usually little difficulty in studying the sperm (see Chapters 3 and 4) The study of the ovum, however, is attended with much greater difficulty Amoroso and Stallworthy devised a technique by which they hoped to collect the ovum when it reached the uterine cavity but all efforts were fruitless At the present time only indirect methods are available for determining whether ovulation has in fact occurred, except in those cases in which abdominal section provides an opportunity of direct inspection of the ovaries The presence of a recent corpus luteum is then proof that ovulation has occurred

Anovulatory Cycles

It should be emphasized that such proof is necessary even in cases in which menstruation is normal and regular, for menstruation does not necessarily imply ovulation Indeed, the occurrence of regular bleeding without preliminary ovulation, i e of so-called anovulatory cycles, is by no means uncommon The frequency of such cycles in healthy women is not yet known, but there is considerable evidence that it is much greater than is usually recognized, and that anovulatory cycles are probably the rule rather than the exception in the adolescent female In a study of women complaining of sterility Sharman found that 6 4 per cent were having anovulatory cycles at the time of their examination

Anovulatory bleeding is often a temporary phase, but the cause of this is not at present understood beyond the fact that the primary site of altered function is almost

patient has now been under observation for nine years There have been no conceptions in this series Periodic examinations are of course essential, for they serve to detect early local spread when this results in enlarged or adherent adnexæ In the series under review, when such changes were observed, the condition was treated by surgical means as already described The hope of the future lies in the development of chemotherapeutic or antibiotic substances effective against the tubercle bacillus

Just as no operation for tubal occlusion is justified in the presence of active uterine or tubal infection, so none should be performed until it has been shown that the husband is fertile The results of plastic surgery by skilled surgeons in carefully selected cases are claimed by some authorities to be encouraging A success rate as high as 20 to 30 per cent has been mentioned by some workers The prognosis obviously depends on the site of the block and the extent to which the remainder of the tube has been damaged The most hopeful cases are those in which the fimbrial end of the tube has been occluded by adhesions without damaging the tube, while the least encouraging are those in which the blockage has occurred in the proximal or interstitial portion of the tube In the former patency can be restored by opening the tube (salpingostomy), while in the latter the tube has to be remodelled over a ureteric catheter or that portion of the tube distal to the site of the block has to be transplanted into the uterus The subsequent behaviour of the tube can be followed by insufflation or lipiodol injection In the light of the evidence now available on uterine and tubal spasm, it seems possible that in the past needless operations have been performed on tubes which were not organically blocked This may provide an explanation of the high success rate claimed by some surgeons when compared with the more moderate figure given by others

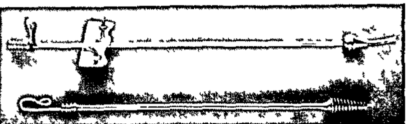


Fig 8 Two types of cannula The upper one is held in p ti n by attachment to a vol ell m The lower on scre s into the c rvical canal

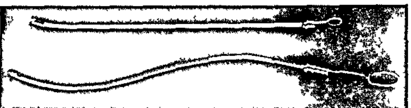


Fig 9A Bi psy curettes with curette end inserted

certainly in the pituitary gland or the associated hypothalamic region of the brain It is generally known that apart from its other hormonal activities the anterior portion of this gland secretes hormones which have a selective action on the ovaries These "gonadotrophic" hormones, of which there are believed to be two, have not as yet been isolated in pure chemical form They are frequently spoken of as Prolan A and Prolan B, although the better terminology is Follicle stimulating Hormone (FSH) and Luteinizing Hormone (LH) Between them they control the maturation of the ovarian Graafian follicles, ovulation, and the development of the corpus luteum FSH is the follicle stimulating hormone under the influence of which the follicle from which the ovum is to be liberated is matured or ripened LH causes the ripened follicle to rupture with liberation of the matured ovum and the immediate subsequent development of the corpus luteum in the ruptured follicle If LH is not produced in effective strength, then ovulation does not take place, and in proportion to the amount of FSH produced, either regular anovulatory bleeding occurs, or, with excessive stimulation of the ovary, follicular retention cysts are formed and irregular bleeding occurs such as that found typically in the condition known as metropathia hæmorrhagica Although this is the generally accepted view of the way in which FSH and LH control the ovarian cycle it should be emphasized that as neither substance has been isolated in pure form there is no absolute proof that the control of ovulation is as outlined above

We have, then, the facts that regular monthly bleeding can occur in the absence of ovulation and that the gonadotrophic hormones have not been isolated in pure form and cannot therefore be estimated with accuracy For this reason indirect methods have to be used to determine whether or not ovulation has occurred, the commonest being endometrial biopsy, basal temperature records and biochemical tests These methods should be considered in some detail

(1) Endometrial Biopsy

Under the influence of FSH the ovarian follicles mature and produce œstrin Later in the cycle, under the influence of LH, ovulation and corpus-luteum formation occur, with the production of still more œstrin and, this time, of progestin from the corpus luteum as well These

two hormones, œstrin and progestin, have a specific and characteristic effect on the endometrium. Œstrin causes it to proliferate, becoming thicker and more vascular with both glandular and stromal hypertrophy. When ovulation occurs, and the corpus luteum is formed, the progestin now liberated acts on this proliferated endometrium and causes the glands to secrete. These changes are easily recognized histologically and are proof that the endometrium has been subjected to the action of progestin. This in turn means that a corpus luteum is active and therefore that ovulation has occurred.

Technique of Biopsy

This simple operation must be performed with scrupulous attention to asepsis. The technique is identical with that already described on pages 68–9 for the investigation of tubal patency, except that a biopsy curette is used in place of a cannula. Several instruments for this purpose are available, three of which used at the Oxford Fertility Clinic are illustrated (Figs. 8, 9A and B, facing pages 80–1). Except in those rare cases in which extreme anteflexion makes the passage of a sound difficult an anæsthetic is not required.

The strip of endometrium obtained is immediately placed in a "fixation fluid" such as Bouin's fluid or 4 per cent formol. The specimen should be reported upon by a pathologist accustomed to the interpretation of endometrial sections, and to assist in the correct diagnosis he should be notified of the date of the last and subsequent menstrual period and of the nature of the menstrual cycle. For private patients the pathologist's fee for this report is usually one or two guineas. If the presence of tuberculous endometritis is suspected then two biopsy specimens should be removed. One is treated as above and the other, intended for bacteriological culture, is sent dry, in a sealed and sterile container, if the laboratory is near at hand. If it is not, or if the specimen has to be forwarded by post, the strip of endometrium should be sent in sterile saline.

From the description already given of the indirect effect of ovulation on the endometrium, it is obvious that to provide the necessary information the biopsy must be performed *after* the presumed date of ovulation. As this is fourteen or fifteen days *before* the onset of the next period, a biopsy taken a week before menstruation is due will give a positive result if ovulation has in fact occurred. None the less, owing to variations which so commonly occur in

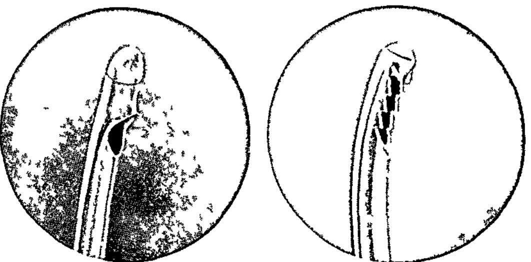


Fig 98 A B Illustration shows biopsy curettes Enlargement of the curette end is shown

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menstrual rhythm, it is advisable as a further precaution to record later the date of onset of the *following* menstruation If it is found that this menstruation started later than was anticipated then, ovulation may have taken place *after* the biopsy was performed Failure to recognize this possibility may obviously lead to an incorrect diagnosis of anovulatory bleeding

On some occasions, although the biopsy reveals evidence of secretory changes indicative of ovulation, the histological picture is not that of a full progestational response The interpretation of such section is not always easy, but it would appear to be either that there has been inadequate corpus luteum activity or that the endometrium has for some unexplained reason reacted inadequately to a normal stimulation

Apart from the danger of sepsis already referred to there is a remote possibility of the biopsy curette dislodging a fertilized ovum which has just become embedded, but this risk is extremely small

(2) Biochemical Estimation

When ovulation occurs the corpus luteum which is formed produces the hormone progestin This in the course of its metabolism yields a substance called pregnandiol which is excreted in the urine and can be isolated from it The process of isolation, however, is tedious and calls for skilled laboratory assistance, and for these reasons pregnandiol estimation is little used as a test for ovulation If the technique becomes simplified, as seems likely, the test will doubtless be used more widely

(3) Basal Temperature Records

An extremely useful method of determining not only the fact that ovulation has occurred but also the time of its occurrence is by studying the daily waking temperature record Van de Velde showed as early as 1904 that variations in body temperature occurred during the menstrual cycle, and it is now known that these variations are due to the influence of the hormones progestin and œstrin Progestin causes a rise in temperature and œstrin a fall These fluctuations can be reproduced experimentally or clinically by the administration of the respective hormones As already explained progestin is formed in the corpus luteum which develops in the ruptured follicle immediately following ovulation, but if anovulatory cycles are occurring it is

not produced and in these circumstances there is not a rise in the basal temperature

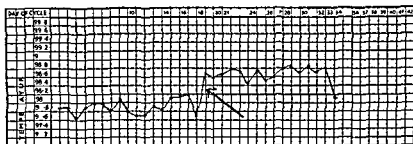


Fig 10A Thirty three-day cycle Arrow points to ovulation

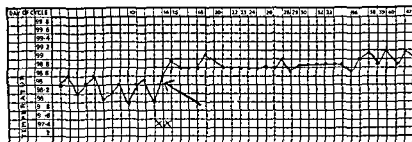


Fig 10B Crosses indicate coitus Pregnancy resulted

In a typical menstrual cycle of 28 days' duration it is found that *one or two days before menstruation the waking* temperature falls to approximately 98° F (see Fig 10) With the onset of the menstrual flow there is a further fall, often to a level as low as 97° F, but before the end of menstruation there is a rise to 98° or 99° F Following menstruation, in the follicular or pre ovulatory phase of the cycle there is a fluctuating level of 98 to 99 F with a sudden fall to about 97° F fourteen or fifteen days before the next period is due Within twenty four to forty eight hours, however, this fall is replaced by a sudden rise to 99° or even higher, and the temperature is sustained at this level throughout the luteal or post ovulatory phase until it falls again on the eve of menstruation If conception has occurred *this fall does not take* place but the temperature is sustained at the high post ovulatory level

It will be understood that the temperature charts are not all as dramatic as the one illustrated in Fig 10A One showing a less clearly defined rise is seen in Fig 10B, but conception has occurred in this case, as can be deduced from

the sustained rise after the twenty-eighth day Pregnancy terminated at term with the birth of a healthy son

When ovulation does not occur, and when consequently there is no corpus-luteum formation and no progesterone phase, there is of course no rise of temperature in the second half of the cycle To express the same fact in a different way if a chart fails to show such a rise of temperature, it is a reasonable inference that ovulation has not occurred In such a case the best check is provided by an endometrial biopsy on the eve of menstruation, by which time the fully developed progestational phase of the endometrium should be present If the biopsy reveals an absence of secretory changes then the diagnosis of failure of ovulation is confirmed

Two points of practical importance become obvious from the above discussion The first is that by keeping a daily waking temperature record a woman of even average intelligence can determine almost exactly the time of ovulation in her cycle, for this occurs when a sudden drop of temperature is followed by an equally sudden rise some fourteen or fifteen days before the next period is due She is thus aware of the most fertile phase of her monthly cycle and, when a pregnancy is much desired, can put this knowledge to good account

The second point of importance is that, if the temperature is maintained at the high level when the next period is due, it provides the earliest possible evidence of pregnancy From the waking temperature chart, in fact, early pregnancy can be diagnosed as dependably as by the Zondek-Aschheim and other laboratory tests, and far more cheaply and simply This early information is of the greatest value to those women who habitually abort or to those who, having at last achieved a much-wanted pregnancy, naturally wish to adopt all reasonable precautions against abortion Forewarned in this way, they can plan to avoid those indiscretions, such as travelling, extreme fatigue and intercourse, to which abortion is often due

Methods of Recording Temperatures

As these waking temperature changes are evidence of a metabolic reaction to the fluctuating level of the hormones it is obvious that it should not matter by what method the temperature is taken, whether orally or rectally There is of course a difference in the temperature which would be recorded at any one time if taken simultaneously by

different routes For example, the rectal temperature is usually about 0 5–1° F higher than the oral reading Moreover, the oral temperature is easily disturbed by other factors such as drinking hot or cold fluids, or not keeping the mouth properly closed, so for practical purposes it may be useful to teach the patient to take the rectal temperature at the same time each evening or morning The daily reading should of course be recorded and the significant variations already described are most easily recognized if the recordings are made on a temperature chart or sheet of graph paper so that the level can be seen at a glance (For further details of this technique see Appendix 4)

(4) Study of Cervical Mucus and Vaginal Smears

Experience at fertility clinics has shown that at the time of ovulation there is usually an increased secretion of cervical mucus This may be sufficient for the woman to become aware of a vaginal discharge for a day or two when none is apparent for the remainder of the cycle Occasionally this discharge is blood stained Even when no external discharge is apparent, exposure of the vaginal vault will show that there is a flow of clear mucus from the cervix which may extend beyond the cervix into the fornix It has been described as "the mucus cascade' by Barton and Wiesner

The cervical mucus undergoes cyclical changes in physical properties which call for further investigation, but about which enough is already known to reveal whether or not ovulation has occurred (see page 47 and Table 2)

In the same way the vaginal epithelium undergoes cyclical changes, and vaginal smears specially stained by variants of the Papanicolaou technique can be used as a means of assessing the phase of the cycle and whether ovulation has occurred These tests are not widely used and their interpretation calls for considerable experience For these reasons, and because the information yielded by them can be obtained far more easily by such methods as keeping temperature records, they must be regarded as beyond the scope of everyday medical practice

(5) Symptoms of Ovulation

In most women proof of ovulation, apart from the occurrence of pregnancy, must be sought by one or more of the indirect methods referred to above Some women, however suffer abdominal pain at the time of ovulation,

and in many this is associated with vaginal bleeding Such bleeding may take the form of a stained mucus discharge, but there may even be a bright loss usually of short duration and lasting from a few hours to a day The pain occurs in either iliac fossa according to which ovary is the site of the ruptured follicle It is usually sudden in onset and is occasionally acute, and it may be associated with vomiting and even transient collapse The pain does not usually last for more than a few hours, but it may be followed by tenderness localized to the iliac fossa and the hypogastrium Furthermore, as already explained, the temperature at this stage of the cycle may rise suddenly to 99–100° F The pain is due to peritoneal irritation by blood leaking from the ruptured follicle, and on rare occasions extensive internal hæmorrhage may occur with associated shock

Abdominal section in these severe cases reveals a peritoneal cavity filled with blood and suggesting the presence of a ruptured extra-uterine gestation, but examination of the tube and ovary discloses that the former is intact and the latter the site of a bleeding follicle This can be sutured without resort to the drastic procedure of removing the otherwise healthy ovary. It must be emphasized that it is only rarely that section is required

Some women experience this mid monthly pain frequently, while others have it on only one occasion or two or three times at the most When the pain is right sided the careless clinician may, and often does, diagnose appendicitis, and many women have been subjected to unnecessary operation and had a normal appendix removed through the surgeon's failure to take account of ovulation as a possible cause of abdominal pain The differential diagnosis turns on the following points

(*a*) The pain begins in the iliac fossa and does not settle there later after the preliminary para umbilical distribution characteristic of the ileo cæcal appendix syndrome

(*b*) It occurs about a fortnight before the next period is due

(*c*) It is often associated with some vaginal bleeding

Treatment of Mid monthly Pain

Treatment consists in giving sedatives and reassurance, while watching for any evidence of continuing internal bleeding If this occurs the pelvis should be explored as already explained, but fortunately this course is seldom

necessary When, as infrequently happens, mid monthly pain recurs with successive periods and so distresses the patient that she seeks for advice two methods of treatment are available If the woman is married she should be told that with the establishment of pregnancy the pain will cease Moreover, she can be informed that the pain marks the phase of her monthly cycle at which she is most fertile If for any reason pregnancy cannot be attempted, then ovulation may be suspended temporarily by giving œstrogenic hormone to inhibit anterior pituitary activity and thereby lessen the formation of the gonadotrophic hormones Stilbœstrol, in a dose of 1 milligram daily for ten days immediately following the period, is usually effective and if this is done for three months then frequently the cycle of painful ovulation is broken and no further complaint is made even when ovulation returns

Treatment of Anovulation

The fact that ovulation is an essential precursor to conception has been referred to at the beginning of the chapter Methods of detecting the occurrence of ovulation, or its absence, have now been described, so the obvious and very important question arises as to what treatment can be given to those women who are anxious to conceive but are not ovulating In the first place, disappointing though it is to admit it, the fact must be faced that at the present time there is no effective specific treatment This is contrary to what is claimed for certain proprietary hormone preparations but none the less it is true On the credit side it should be remembered that fortunately the occurrence of anovulatory cycles is commonly of limited duration and normal menstruation with preceding ovulation spontaneously recurs in many cases The obvious rational line of treatment is to administer gonadotrophic hormones and possibly as effective preparations become available these will yield results more encouraging than those obtained so far In the meantime the results are disappointing According to Hamblen and Davis, however, the treatment is worth trying in those cases in which investigation shows that the only apparent cause of sterility is that ovulation is not occurring The preparations available for clinical use are of two main types, the serum gonadotrophic hormones and the chorionic gonadotrophic hormones The former are prepared from the serum of pregnant mares and are rich in follicle stimulating properties while the latter, prepared from the urine

CHAPTER EIGHT

THE RELATION OF PELVIC DISORDERS TO INFERTILITY

FROM the discussions in the previous chapters it will be clear that the factors most often responsible for infertility are those which are not apparent on ordinary routine clinical examination Typical examples are azoospermia in the male, tubal spasm or occlusion, anovulatory bleeding, and tuberculous endometritis in the female In the face of such determinants of infertility the practitioner does well to hesitate before assuring a woman anxious to conceive that there is ' nothing to worry about" simply because examination has revealed a healthy or apparently healthy pelvis Such advice, given on such evidence, has been responsible for depriving many women of the babies they might otherwise have had The corollary is of course equally as important If the pelvic examination reveals some abnormal condition such as fibroids, uterine mis placement or ovarian cyst, the natural tendency is to indict this as the cause of the infertility, but in the light of present knowledge of ætiology this assumption cannot be justified A wrong decision made and acted upon at this stage may again deprive the woman of her chance of conceiving and bearing children

The point may be illustrated by an example A woman in the late thirties, in robust health and with no menstrual dysfunction, consults her doctor because after several *years of married life she has not conceived In the course* of examination he finds that the uterus contains some fibroids and, assuming that these are probably responsible for her sterility, tells her to see a surgeon The surgeon confirms the diagnosis and perhaps performs a hysterectomy with the result that at the end of treatment the unfortunate woman s plight is much worse than at the beginning If, on the other hand, he is more conservative in outlook and practice, the surgeon will probably perform a myomectomy, but if the cause of the sterility is, for example, azoospermia, even this correct treatment of the fibroids will not solve the patient s

problem Yet everybody concerned has acted in good faith, the one thing lacking has been a balanced view of the pathogenesis of subfertility Such errors will be avoided by the establishment throughout the country of clinics at which an informed opinion can be obtained on all the many problems associated with childbearing

General Principles

Although every case presents its own particular problems and must accordingly be appraised separately, it is possible to define certain general principles which govern the relation between pelvic disorders and fertility

The first is that apart from blocked tubes, or tubes which are grossly disorganized by infection, there is no local pelvic disorder which can without further investigation be held responsible for sterility in a woman who is menstruating normally and whose marriage has been consummated It must of course be remembered in this connection that genital hypoplasia and anovulatory bleeding, both of which are frequently responsible for infertility, are not primarily pelvic disorders but, as emphasized in previous chapters, manifestations of pituitary dysfunction Women have conceived and been delivered of healthy living infants in spite of severe cervical tears and infections, uterine misplacements, fibroids, ovarian cysts, endometriosis, and even carcinoma of the cervix None the less each of these conditions is likely in any particular individual to impair fertility and, as explained in the later sections of this chapter, in some of them the onset of pregnancy can be a serious complication

This leads straight to the second principle—namely, that

TABLE 3

PELVIC ABNORMALITIES IN 750 CASES OF PRIMARY AND ACQUIRED STERILITY

Condition detected	*Percentage incidence*
Retroversion	10
Cervical infection erosion and polypi	5
Fibroids	3
Severe hypoplasia	1
Cysts	1
Sepsis (excluding tuberculous infections)	0 8
Tuberculous infections	3

Cervical Infections

As shown in Table 3 these are very common It is well known that they are also common during pregnancy, and at every antenatal clinic of any size there are always patients complaining of a troublesome discharge originating from an infected cervix or a cervical polyp or erosion It is probable that the condition is not in itself a serious factor in delaying conception, but none the less it should be treated before pregnancy occurs This is desirable for two reasons In the first place, it is a good practice whenever possible to eradicate all known foci of infection before a pregnancy begins so that the patient may enjoy the best possible health during gestation and the smallest chance of developing sepsis as a result of the labour Secondly, it often happens that a woman complaining of sterility conceives soon after an infected cervix has been satisfactorily treated, or a cervical polyp has been removed With the advent of specific chemotherapy a valuable new method of treating these cases has been provided The response of an infected cervix to sulphonamide or penicillin therapy is often dramatic

A word of warning should be given about the treatment of cervical infections and erosions The technique of cauterization is dealt with in most gynæcological textbooks With the exception of cases in which there is an extensive endocervicitis, superficial radial cauterization is an effective treatment easily performed without admitting the patient to hospital When there are extensive cervical tears or a badly infected cervix with endocervicitis, in-patient treatment is needed for careful repair of the tears or deep cauterization of the infected areas From time to time the tragic results of bad treatment are seen The patient is usually a young woman, often nulliparous, whose cervix has nevertheless been amputated by some well-meaning surgeon for the treatment of vaginal discharge of cervical origin The lacerated cervix following childbirth or abortion is also too often amputated instead of being repaired The danger is that sterility may follow the operation (see page 53), or if conception does occur, the risk of abortion or premature labour is greatly increased

Fibroids

These are not uncommon in women over 30, and contrary to what many text books would suggest are found fairly frequently in the age group 20–30 At the Oxford

Fertility Clinic 3 per cent of the patients attending were found to have unsuspected fibroids As a contrast to this the records of any large maternity department would show that the association of fibroids and pregnancy is by no means uncommon, the tumours being usually felt for the first time on the enlarging pregnant uterus As therefore the tumours are found in both infertile and pregnant patients, the question naturally arises whether they do in fact cause sterility

It can be stated at the outset that fibroids which do not cause menstrual symptoms are unlikely to be responsible for sterility It is true that on occasions they may so distort both tubes as to make fertilization unlikely, but when this occurs there are usually other symptoms such as dysmenorrhœa or menorrhagia In doubtful cases utero-salpingography, as described in Chapter 6, is a most useful method of determining whether such distortion is present either in the uterine cavity or in the tubes When fibroids give rise to symptoms such as menorrhagia or dysmenorrhœa, the possibility of their being responsible for sterility is greatly increased, for in these circumstances the tumours are usually intramural or even submucous, thus distorting the uterine cavity or the tubes or both These are the cases in which pregnancy so often follows skilfully performed myomectomy Bonney (1946) records that in 137 women of childbearing age who were anxious to conceive, the operation was followed by conception in 52 cases or 38 per cent In this connection it must be stated that the treatment of fibroids during the childbearing age does not come within the scope of general surgery Whether the woman's hopes are to be shattered by a hysterectomy or fulfilled by myomectomy will usually depend on the surgeon's experience and skill An experienced gynæcologist can give a very accurate opinion on the important question whether myomectomy will be technically possible, but the patient should none the less realize that at operation a hysterectomy may be found necessary The aim of surgery in this condition is the avoidance of unnecessary hysterectomy

Fibroids and Pregnancy

The next important aspect of the subject is how fibroids and pregnancy affect each other Can pregnancy seriously complicate fibroids, or fibroids seriously complicate pregnancy? If the answer were yes it would follow that all fibroids detected in the fertility clinic should be removed

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former conviction, decided that they now wanted another child After some months of disappointment they sought medical advice Examination revealed an unsuspected fibroid the size of an orange in the fundus of the uterus, but the sperms were healthy, ovulation was occurring, the tubes were patent, and the endometrium was in good condition It was considered that there was no evidence that the fibroid was causing the delay in conception and that an operation would result in some months' delay before the patient would be fit to conceive At the age of 42 those months were possibly vital For this reason the couple were merely given advice on the fertile period and to their delight conception occurred two months later and resulted in the birth of a healthy daughter

The treatment of fibroids *during pregnancy* is easier to outline They are best left alone except on those rare occasions when they cause obstructive symptoms such as retention of urine, which has already been discussed, or an acute abdomen due to torsion or hæmorrhage Their treat ment when they cause dystocia at term does not come within the scope of this work It should be emphasized, however, that the size of the fibroids is not of itself a valid reason for their removal during gestation This should be obvious when one remembers the extraordinary accom modating powers of the abdomen during a multiple pregnancy, but none the less patients are sometimes advised to have their fibroids removed during pregnancy because "they are so large there will be no room for the baby" Unfortunately, hysterectomy is the method not uncommonly employed, with tragic consequences to women longing for parenthood that can well be imagined A good example of the satisfactory results of a more conservative attitude is given in the following case record

A woman aged 34, suffering from menorrhagia, was admitted to hospital under the care of a general surgeon for hysterectomy for fibroids The tumours, which were multiple and included a large one in the cervix, filled her pelvis and extended into her abdomen up to the level of the umbilicus The surgeon thought that, the patient being single, myomectomy would be preferable to hysterectomy and accordingly referred the case to a gynæcological colleague Examination confirmed his findings but also revealed an area of suspicious softening above the cervix and some bluing of the vagina Pregnancy was suspected and confirmed by a urine test, so the operation was deferred and the pregnancy allowed to continue Apart from a threatened miscarriage at 4 months it progressed uneventfully to term As the cervical fibroid made a vaginal delivery im

before pregnancy occurred But fortunately this is not necessary It is true that these tumours, which may undergo degeneration at any time, are particularly liable to do so during pregnancy and the puerperium The type of degeneration which most commonly occurs at these times is necrobiosis or so called "red degeneration" This is characterized by pain and tenderness over the site of the tumour and occasionally by a mild pyrexia of 99–100° F The condition is not serious and the symptoms subside in a few days with rest in bed and sedatives The fact that this complication may occur does not justify the wholesale removal of small fibroids which are causing no symptoms Once it has occurred, however, myomectomy should usually be performed before the patient starts a further pregnancy, but operation may be deferred until the child is weaned if this assists the domestic arrangements

It has been pointed out (see page 95) that fibroids should be removed before pregnancy if they cause such symptoms as menorrhagia and dysmenorrhœa A further important indication for their removal is when they are so situated as to cause, or threaten to cause, pressure symptoms in the pelvis The cervix is the usual site for such tumours, and cervical fibroids should always be removed when detected in women anxious to conceive There are two reasons for this First, enlargement during pregnancy is liable to cause acute retention of urine, and secondly, *even if this does not occur, obstruction at term is almost* inevitable In cases of retention the only effective treatment is to remove the fibroid, though with cervical tumours this almost always necessitates termination of the pregnancy as the first stage of the operation Often, indeed, it is necessary to perform a hysterectomy for a tumour which could have been removed by myomectomy had pregnancy not also been present

Myomectomy is also indicated before pregnancy if the tumour is large Frankl once stated that degeneration, either insidious or acute, was an inevitable complication of large fibroids, and for this reason most British gynæcologists advise the removal of any fibroid which can be easily palpated through the abdomen, whether it is causing other symptoms or not There are of course occasions on which this general rule is best ignored, as illustrated by the following case record

A woman of 42 lost her only child aged 9 years Both she and her husband were terribly distressed and against their

cystic ovary is seldom larger than a goose's egg It is due to retention cysts in the Graafian follicles and as these regress the ovary will return to its normal size If in a given case the precise cause of the ovarian enlargement is doubtful a straight X-ray examination of the pelvis may clear up the difficulty by showing the translucency or the calcified elements characteristic of a dermoid cyst If radiography does not help, then rather than perform an unnecessary section it is advisable, in the absence of symptoms, to postpone operation and to re examine the pelvis a month later If the tumour is enlarging it is a new growth and should be removed

Sepsis

Reference has been made earlier (see page 74) to the fact that the most common form of pelvic infection encountered *in the fertility clinic is tuberculous The attitude to* pyogenic infections of the tubes has changed in the last twenty years At one time they were treated as surgical emergencies and treated by removal of the tubes, but it was then discovered that even with respect to primary mortality the results were much improved when the condition was treated conservatively and the patient was nursed on the "four F s" routine—namely, Fowler position, fomentations, fluids and four hourly pulse and temperature chart The advent of chemotherapy has still further improved the results None the less cases of chronic tubal sepsis of pyogenic origin still occur from time to time and cause sterility by blocking the tubes A pyosalpinx requires removal, but lesser degrees of damage can sometimes be treated by conservative plastic operations on the tube

possible, a Cæsarean multiple myomectomy was performed Since then this patient has twice been delivered vaginally of healthy infants

Severe Hypoplasia

This condition is difficult to define for the standards must of necessity be arbitrary Some experienced workers regard it as one of the most important causes of sterility In severe cases there is a small rudimentary uterus with either primary and permanent amenorrhœa or scanty losses at very infrequent intervals Often associated with the uterine condition is a poorly developed vagina with a constricted conical vault The treatment with œstrin and progesterone, combined with pelvic diathermy, has been referred to on page 61 The prognosis must be guarded but is by no means hopeless, especially if the condition is diagnosed and treatment instituted while the patient is young In cases in which the shape of the vagina results in dyspareunia plastic surgery gives good results

Ovarian Cysts

An eminent American gynæcologist once stated that every ovarian cyst was potentially fatal This sounds serious but unfortunately it is true The most benign looking *tumours are all too frequently malignant, and benign* or malignant alike they are peculiarly liable to cause an acute abdominal emergency by torsion, infection or rupture *For these reasons any woman who has an ovarian cyst* should have it removed, and arrangements for its removal should be made when it is first diagnosed The fact that *the woman is complaining of sterility, or is found to be* pregnant, is no reason for departing from this rule There is one point, however, that requires emphasis—namely, *that in women of child bearing age ovarian cysts should,* when possible, be enucleated so as to conserve healthy ovarian tissue When this is done it is equally important that the cyst should be examined carefully in the theatre before the operation is continued, so that before leaving the ovary the surgeon can be assured that the tumour is benign

One note of warning should be sounded On occasions there is some uncertainty whether an enlarged ovary revealed on pelvic examination is a small ovarian cyst or an enlarged cystic ovary It will be appreciated that whereas the former is a new growth the latter is not An enlarged

been explained (see page 80) that with the liberation of the ovum the ruptured Graafian follicle undergoes a rapid transformation to become the corpus luteum Before the fertilized egg has embedded in the uterine decidua some three to seven days later, this corpus luteum has become well developed and has started to secrete progestin, the uterine sedative It must, of course, be emphasized that the sedative action of progestin is but one of its effects on the uterus, though during gestation it is a most important one During pregnancy, after a period of great activity, the corpus luteum wanes until by about the twelfth week most of the progestin required is being formed by the now fully differentiated placenta

It is well known that most abortions occur during the first twelve weeks of pregnancy In other words, they occur during the unstable period of early fœtal development when the hormonal control of the growing uterus is being transferred from the maternal glands to the placenta It is thus a reasonable assumption that if at this stage abortion is threatened, or occurs, it may be due to an inadequate supply of the uterine sedative, and this is in fact the rationale of the administration of progestin in cases of threatened or recurrent abortion It is well to remember, however, that sedatives are given to promote rest in place of excitement or activity, and if such excitement and activity can be avoided in the first place there will usually be no need for the sedatives This aspect of the treatment of abortion is too frequently overlooked During the first twelve to fourteen weeks of pregnancy the uterus appears to be most irritable at the times when menstruation would have occurred had gestation not taken place Increased pelvic congestion, or direct pelvic trauma, at these times is particularly dangerous, and for this reason sexual intercourse, especially if the gravid uterus is also retroverted, the consumption of gin and cocktails, long journeys by car, and excessive fatigue are best avoided if the pregnancy is to be given a chance of progressing It is interesting to note in this connection that rail, air and sea travel appear to involve less hazard than travel by road

Every woman should have these matters explained to her when she first sees her doctor early in pregnancy, and this is even more necessary if she has already had an abortion In such cases, if no history can be obtained of a predisposing factor which may have been responsible for the abortion, it is reasonable to assume that the uterus

CHAPTER NINE

PROBLEMS OF ABORTION

A DISCUSSION of the problem of infertility would not be complete without at least a passing reference to the subject of abortion Failure to conceive is a terrible disappointment to many women, but when conception is followed by the loss of the much-wanted infant, even in its embryo state, the shattering of hopes temporarily raised may produce profound psychological disturbances It is easy to realize the mental conflict which can result if abortion recurs with successive pregnancies So much has been published on the place of hormone therapy in the treatment of abortion that many doctors are now a little confused in their attitude to the whole subject There is a natural tendency in the circumstances to lose a sense of proportion and to forget those commonsense things which are still more important than hormones

A young woman was sent by her doctor to a fertility clinic because she had, much to her distress, aborted at three months in three successive pregnancies The usual question was asked as to what hormone should be used to safeguard any further pregnancy The patient was a perfectly fit young woman with a healthy pelvis She had married a sailor in the Royal Navy who after a short leave returned to sea but not before his wife had started her first pregnancy Some three months later he returned for a few days and following the reunion the first abortion took place On his next leave the second pregnancy started to be followed by abortion when he again returned When for the third time the same sequence occurred the anxious pair sought medical advice and were relieved to learn that abstinence and not surgery or injections was all that would probably be required A honeymoon is not the best way to rest a pregnant uterus

Administration of Progestin

The two ovarian hormones, œstrin and progestin, are in some respects antagonistic in their effect on uterine activity Œstrin is a stimulant which excites more frequent and powerful contractions, while progestin acts as a sedative and helps to keep the uterus at rest It has already

able evidence to suggest that the treatment may not be justifiable

Administration of Vitamin E

Considerable evidence has been advanced to suggest that the vitamins, particularly vitamin E, are also essential for the maintenance of normal pregnancy and that vitamin E deficiency may itself be a cause of abortion Although the claim has not been completely established, there is sufficient evidence to make it reasonable, or even advisable, to supplement the diet with extra vitamin E A useful way of giving it is in the form of Bemax which, in addition to other valuable ingredients, contains adequate vitamin E if taken in the prescribed doses, or it can be given as wheat germ oil capsules A synthetic form is also available, but there are still some doubts as to its efficacy, and until this issue is settled the natural products should perhaps be preferred

Syphilis and Abortion

The importance of syphilis as a cause of abortion was somewhat overrated in the past, but the prompt detection and treatment of maternal syphilis are nevertheless so important for the unborn child that routine Wassermann testing of the blood in early pregnancy should be universally practised Syphilitic infection of the fœtus can be a cause of abortion in the later months, but it more commonly results in premature labour

Rhesus-factor Incompatibility

Blood testing has come into prominence recently for a different reason During the last few years considerable attention has been focused on the subject of erythroblastosis fœtalis and the underlying blood incompatibility which gives rise to it The subject has now assumed great clinical importance not only because of the risks to the fœtus but also because of the possibility of unfortunate and even fatal transfusion reactions occurring in sensitized patients The condition may on rare occasions be a cause of abortion in the later weeks of pregnancy, and for this reason and because the subject if studied in all its implications is difficult and confusing, an attempt is made in the following paragraphs to set out the main facts as simply as possible

may be more irritable than usual and to combine advice with the administration of progestin This can be given intramuscularly in doses of 10 units[1] on alternate days for two or three injections beginning on what would normally have been the first day of the period The cost would be approximately ten shillings for three injections, or thirty shillings for the three months' course An alternative method of administration is by the oral route, using ethisterone Fifteen milligrams given daily for the week of the sup pressed period would cost about ten shillings The implantation of a 25- or 50-mg tablet of progesterone deep into the gluteal muscles is a useful way of administering this hormone in such cases

While the administration of progesterone is a logical method of treatment in these cases it is of course difficult to assess the results scientifically In the opinion of the writer it is more important that the woman should take care of herself during the early months of pregnancy, following the precautions already indicated, than that she should receive hormone treatment If in spite of reasonable care abortion is threatened, or if there is a history of abortion with the previous pregnancy, then it is reasonable to administer progestin

More recently it has been suggested that the œstrogenic hormones should be used in treatment of threatened abortion The basis of this treatment is the claim made by Smith et al (1941) that œstrin stimulates placental hormone production with a resultant increased formation of progesterone This claim has since been disputed by several workers including Sommerville et al (1949)

Moreover in 1930 Parkes showed that in rodents pregnancy could be terminated at any stage of gestation by the administration of œstrin, and Leyland Robinson et al (1935) reported bleeding and uterine contractions in three out of twelve patients to whom this hormone was given in an attempt to procure a therapeutic abortion This was in spite of the fact that the doses were considerably less than those recently recommended in the treatment of threatened abortion

From the above conflicting evidence it would appear that at the present time there is not a proven case for the administration of stilbœstrol, or other œstrogenic preparation, in the treatment of abortion In fact there is consider-

1 Progestin (B D H) Lutren (Bayer) Luteostab (Boots) Proluton (Schering) Gestone (Paines and Byrne) Progestin (Organon)

bodies in the blood of the recipient in the same way as the sheep cells are hæmolysed in the rabbit The reaction to this second transfusion may be so violent that it proves fatal This is the undoubted explanation of many hitherto unexplained transfusion deaths where there was no question of error in the usual grouping or cross matching These are usually described as "intra group" tranfusion reactions

(6) A somewhat similar phenomenon may occur when a Rhesus negative woman marries a Rhesus positive man If pregnancy occurs the infant may be born with erythroblastosis as a result of the Rh incompatibility The reason for this is that the male transmits the Rh factor to the fœtus, with the result that the fœtus is Rh positive even though the mother is Rh negative If the man is homozygous for Rh (i e if he has a genetic constitution that can be represented by Rh Rh) he will transmit this characteristic to all his offspring, if he is heterozygous (i e has the genetical constitution Rh rh), only half the offspring on the average will be affected

(7) When the condition is thus transmitted, the agglutinable factor in the fœtal blood, as was first postulated by Levine in 1941, may pass through the placental circulation into the maternal bloodstream The reaction is then the same as that described when a transfusion of Rh positive blood is given to an Rh negative patient The maternal system produces antibodies to this agglutinable factor, and these antibodies can be detected and estimated in the laboratory

(8) The sensitization of the mother to produce these antibodies is often a slow process and may extend over several pregnancies In such cases one or more normal children will be followed by one suffering from erythro blastosis If before her first pregnancy the mother has already been sensitized by a transfusion of Rh-incompatible blood then the trouble may be manifest in her firstborn

(9) The explanation of these events is briefly as follows The maternal antibodies pass through the placental circu lation into the fœtal bloodstream where they produce hæmolysis of the fœtal red cells To compensate for this destruction the fœtal blood forming tissues hypertrophy, and accessory areas of such tissues may develop throughout the body The resultant disturbance to the developing fœtus may be so severe that intra uterine death occurs with abortion or premature labour If the infant is born alive it may be jaundiced or anæmic, and either condition

(1) It is common knowledge that if the red blood cells of one animal, say a sheep, are injected into the circulation of another animal, for example a rabbit, they stimulate the production of antibodies which would bring about the destruction of any similar cells injected at a later date This fact is used in such well-known blood tests as the Wassermann and gonococcal fixation tests

(2) It has also been long realized that in the human subject a blood transfusion cannot be given without risk unless the blood groups of both donor and recipient are known so that compatible blood can be selected As an extra precaution the blood to be given should be cross matched with serum from the patient The reason for this is that if incompatible blood is transfused the red cells of the donor are agglutinated or clumped together, and in the resultant reaction there may be sufficient interference with renal function to cause the death of the patient

(3) Further, it is known that in some circumstances, even if the blood has been accurately grouped and cross matched, there may be a severe and even fatal reaction Fortunately, this is rare but when it occurs it does so in a patient who has been transfused before, or in a woman who has been pregnant The trouble in these cases is not agglutination of the red cells, for this possibility has been eliminated by careful cross matching, but an event akin to that described above in the rabbit when sheep cells are injected

(4) The explanation is that there exists in the blood, quite apart from the factors which normally have to be considered in every transfusion, at least one other agglutinable factor, the Rhesus factor, whose significance has only in the past few years been recognized Eighty five per cent of people, male and female, have this factor in their blood, irrespective of its group, and it is called the Rhesus factor because it is always present in the blood of the Rhesus monkey These people are said to be Rh positive while the remaining 15 per cent of the community who do not possess the factor are said to be Rh negative

(5) Now if a patient who is Rh-negative is transfused with Rh positive blood a sensitization or immunization may occur as a result of which antibodies are developed to the agglutinable factor If when these antibodies have been formed a further transfusion of Rh-positive blood is given, the result of the immunization becomes manifest, for the red cells of the donor are hæmolysed by these anti-

needle should be dry and sterile (Syringes sterilized by immersion in alcohol should not be used) The Ministry of Health has divided the country into regions for blood transfusion services and in each region there is a central laboratory where this testing is done on request

Fertility Advice after Abortion

The question is often asked as to what can be done for a patient who, having aborted, is anxious to conceive again It is obvious that an endeavour should first be made to discover the cause of the abortion A history of indiscretion, as described earlier in the chapter, may provide the necessary clue Failing this the general or pelvic examination may yield relevant information, as for example evidence of chronic nephritis or of some precipitative factor such as fibroids, a double uterus, or a retrodisplacement If, as is usually the case, no cause is found, and if the patient is well, there is no reason why she should not lead a normal life and conceive again as soon as possible The habit of advising against a further pregnancy for arbitrary periods of many months is deep rooted but has little to commend it in these cases None the less it should be remembered that many women when they abort bleed excessively and have a resultant anæmia Others retain placental fragments of varying sizes, as a result of which they may have irregular bleeding, stained discharge, and menorrhagia associated with uterine sub involution In such cases the anæmia should be combated with iron and the placental fragments carefully evacuated by gentle curettage, and it is desirable to recommend waiting until full health is restored before deliberately embarking on a further pregnancy

Habitual Abortion

A very difficult group of cases are those in which abortions occur repeatedly Patients who abort in this way are often described as "habitual aborters", and from time to time claims have been made for the successful treatment of this condition The fact remains, however, that it still constitutes a problem which is largely unsolved Among the cures suggested have been the administration of thyroid and vitamins, arsenical therapy even in the absence of clinical or laboratory evidence of syphilis, and hormone therapy with progestin and gonadotrophic preparations There is some evidence that the "irritable uterus" to which

may develop so rapidly that death occurs within the first few days of life

(10) Transfusion of the infant at birth with antibody free Rh negative blood is life saving to many infants who would otherwise die At the present time there is no method whereby the sensitized mother can be desensitized, and until this becomes possible there is no way of treating the condition while the infant is *in utero*, and no way of preventing a recurrence of the trouble in subsequent pregnancies A pathologist skilled in this subject can predict, however, after testing both husband and wife, how great the chances are of subsequent pregnancies being affected

The subject of Rh incompatibility is of course far more complex than may appear from this brief description, but what has been said of its relationship to intra uterine fœtal death will, it is hoped, be of help to those who wish to have a working knowledge of this difficult and perplexing subject

Some Practical Considerations

Rhesus testing of expectant mothers is now a routine practice in many large maternity units For the same reason obstetrical flying squads use Rh-negative blood for the emergency transfusion of patients whose Rhesus group is unknown The object of routine testing is to protect both the mother and the child If the mother is Rh negative she will, if she needs a transfusion, receive Rh negative blood Moreover, if she is Rh negative the husband is tested too, and if he proves to be Rh positive, arrangements are made for closer supervision of the patient in the later weeks of pregnancy This involves periodic testing of the mother's blood for the presence of antibodies, for if these are present in increasing amounts it means that the fœtus may be affected The question of premature induction of labour when the child is viable must then be considered and arrangements should be made for transfusion of the newborn infant should this be necessary It is obvious that considerable team work is required for the expert handling of such a case, and for this reason the delivery should take place in a well equipped maternity home or hospital with adequate pathological facilities

A pathologist trained in this work, if he has good testing serum available, can give a report on the Rhesus factor of a sample of blood within about five hours He needs 5 c c of whole clotted blood Given this amount he can if required also test for antibodies It is essential that the syringe and

well defined, and each case must be considered on its merits There are, for example, types of uterine malformation which are benefited by plastic operations such as the removal of a rudimentary horn, but there are many for which surgery would appear to offer little prospect of improved function and it should be remembered that function is more important than anatomical shape For pronounced irritability the logical treatment would appear to be by sedation, as for example by the administration of phenobarbitone (luminal) grain 1 daily, in combination with the measures already discussed for the treatment of threatened abortion (see page 100)

The work of Walker and others has shown that abortion is on occasions associated with a sub fertile male For this reason in cases of recurring abortion it is advisable to have the male carefully tested and if the specimens are of poor quality he should be referred for further investigation and treatment to a genito urinary specialist interested in fertility Christie Brown has suggested that in such cases the prognosis can be improved if the nest in which the fertilised egg develops, namely the decidua, is better prepared to compensate for an ovum lacking in vitality as a result of fertilization by a sperm of poor quality He advises giving the patient both progesterone and œstrogenic hormone from the time of ovulation until the 16th week of gestation Ethisterone mg 10, and Dienœstrol mg 0 6 are given daily

Threatened Abortion

Although the detailed treatment of abortion does not come within the scope of this book there is one point to which a brief reference may be made How long should the patient be kept in bed when abortion has threatened? In our view a week without bleeding should pass before the patient resumes an active existence This is reasonable Confusion arises and many patients are quite unnecessarily sentenced to a further and even prolonged term in bed when, as so often happens, a dark blood stained discharge persists or recurs on the resumption of activity This dark discharge is not of serious significance, and indeed is rather to be expected if there has been any considerable vaginal bleeding It should be recalled that the bleeding is arrested by the formation of a clot over the intra uterine site, and it is the absorption and liquefaction of this clot, and not a recurrence of actual bleeding, that gives rise to

reference has been made in Chapter 5 may also be a cause of abortion, and if this is so it would follow that it may be the responsible factor in cases in which abortion is habitual An autonomic nervous system sufficiently unstable to respond violently to stimuli of minimal intensity could well provoke strong uterine contractions In this way emotional disturbances, even excessive anxiety lest misfortune should overtake the pregnancy, could initiate an abortion, and once abortion has occurred the increased anxiety on the next occasion might well predispose to a recurrence When this cause is suspected the importance of winning and maintaining the confidence of the patient cannot be over emphasized None the less it will be obvious that problematical causes, such as autonomic instability, should not be postulated in any given case until all other possible factors have been investigated and eliminated For that reason a careful history and thorough general and pelvic examination are essential, as are also blood tests for syphilis and rhesus incompatibility These latter tests are particularly important when the abortion occurs in the later weeks of pregnancy, as it so often does with the "habitual aborter" The reason for the tests has been explained earlier in the chapter

The importance of a careful history is illustrated by the following case record

A woman of 34 consulted her doctor during the early weeks of her eighth pregnancy She stated that on the previous occasions abortion had occurred, but further questioning revealed that these seven abortions had all been induced Now for the first time the patient was anxious to have a child And this she did, though it must be granted that she was very fortunate

If neither the history nor the examination reveals any explanation for the repeated abortions, it is worth while examining the uterus under the X ray screen during the injection of a radio opaque material such as lipiodol The technique is the same as that already described in Chapter 6 The examination may reveal some unexpected uterine abnormality such as a double uterus of one degree or another, for the incidence of congenital abnormalities is relatively high in these cases of repeated abortion The screening will also reveal uterine irritability if this is present, and also, rarely, the presence of intramural fibroids

Unfortunately, at the present time the treatment of neither uterine malformation nor uterine irritability is

CHAPTER TEN

ARTIFICIAL INSEMINATION

I TECHNICAL ASPECTS

DIRECT or artificial insemination (A I) has been considered for many years—to our certain knowledge for over a century—as a means of overcoming barrenness in human beings In domestic animals the practice dates very far back, but rather as a convenient way of making full use of and conserving valuable sires than of combating sterility Its application to human beings has always provoked heated controversy and still does In patriarchal communities such as those of the Arabs and Turks it is unlikely to be readily accepted, in those with a matriarchal pattern such as the American it has already become firmly established In Britain it has been practised for many years in a very limited number of cases, but of these only a few records are available Marion Sims evoked a storm of criticism in the middle of the nineteenth century when he described A I with the husband's semen, and it is only in recent years that the subject has again come to the fore

It should be clearly understood that the two types of artificial insemination—namely, insemination with the husband's semen (A I H) and insemination with semen from a donor (A I D)—have quite distinct uses and involve equally distinct moral and legal problems These problems are considered elsewhere (see page 115) and this section is concerned exclusively with the technical aspects of both types of artificial insemination

Insemination with Husband's Semen

The former, A I H , has been advocated in cases in which there are psychological and mechanical difficulties associated with coitus, e g impotence, vaginismus, malformation of male external genitals, misplaced cervix and so forth It has also been used when post coital tests have been repeatedly negative, due either to hostile vaginal or cervical secretions or to poor quality but not hopelessly

the vaginal discharge Complete rest should be resumed *only if the discharge is bright red in colour* When a recurrent or persistent slight stained discharge suggests a threatened abortion, and occurs apart from any free vaginal bleeding, it should be remembered that a cervical polyp or vascular erosion is quite possibly the origin of the trouble With a suitable speculum and a good light such as is provided by the instrument mentioned on page 69, the cervix can be gently exposed without risk of interfering with the pregnancy Polypi can be easily avulsed but it should be remembered that their base tends to bleed more freely during pregnancy than at other times Erosions are best not interfered with during the pregnancy, but the cervix should be cauterized at the postnatal examination if the condition is then still present

infecund semen And finally it has sometimes been adopted as a "last resort" procedure

A I H is not always practicable Thus, it is an essential condition that the husband should be able to produce semen by masturbation, for if, as occasionally happens, he is incapable even of this, no artificial device has yet been found by which semen can be obtained Insemination by means of expressed vesicular and prostatic secretion, or of sperms obtained by epididymal or testicular puncture, is doomed to failure

Insemination with Semen of Donor

A I D has been advocated (*a*) in cases in which the husband is hopelessly and irremediably sterile (infecund) and in which the wife is apparently fecund, (*b*) in cases of Rhesus incompatibility, i e in which the wife is Rh negative and there have been one or more fœtal disasters, (*c*) in cases in which the husband has a severe hereditary disability, (*d*) as a long-term eugenic means of improving the stock by inseminating with sperms from sires of out standing mental and physical attributes Only the first three of these indications have so far been seriously contemplated, or followed, in Britain, and the number of resulting children is still too small to justify any assessment of the results

Choice of Donor

The potential donor should be healthy and well endowed physically and mentally and give a family history free of *alcoholism, criminality and hereditary defects and diseases* He should not have any unusual physical features which might facilitate his identification His semen should be of *high quality He should already have produced a family* of his own, thus providing evidence of his fecundity and capacity to produce desirable offspring The possession of a family has the further advantage that it satisfies the donor's own parental instincts He should be of sufficiently mature age to make possible a just assessment of his qualities Needless to say he should also be Wassermann-negative and belong to a Rhesus group compatible with the woman's

To find men who satisfy all these conditions and are willing to undertake the required responsibilities is not easy and in fact those who carry out A I D have very few donors to draw upon

It is worth adding that, although in theory the number of conceptions that might be brought about with one specimen of semen is very high, this could hardly occur in practice in view of the different ovulation times of different patients

The donor must in all cases remain anonymous His identity must not, on any account, be revealed to the recipients, nor theirs to him The burden of secrecy must be carried by the doctor alone This precaution is designed not merely, as some writers on the subject have held, to prevent unscrupulous exploitation of the knowledge by ill-disposed persons, but to avert the risks of emotional tensions such are only too liable to arise between the recipients and the donor if they are known to each other

Technique of Artificial Insemination

The technique is simple and is essentially similar in both types of insemination Semen should be collected, without the aid of a sheath, direct into a glass tube warmed by hand to body temperature Ideally it should be used as soon as possible after liquefaction is complete In practice, however, some delay is not uncommon, and if the semen cannot be introduced until some hours after it has been collected, it should in the meantime be kept cool, preferably at about 4° C Various special methods of collection, storage, etc have been and are being investigated (e g diluting the semen with a buffered glucose solution, collecting the first fraction only of the ejaculate, storing at extremely low temperatures in carbon dioxide snow, centrifuging when the density of the sperms is low, and so forth) but all these are still in the experimental stage In the author s experience 15 hours is the longest storage time of semen used successfully for A I

For the actual insemination only two instruments are needed—i e a speculum and a syringe A glass syringe can be used (2 c c is a convenient capacity) with a long-handled piston and a metal bayonet fitting cannula, or a fine cannula made entirely of plastic and long enough to reach the cervical canal may be fitted to an ordinary record syringe The cannula should have a capacity of 1 or 2 c c and be so graduated that the semen is measured into and delivered from the cannula (Fig 11 facing page 113) Provided that there is no need to economize semen and that both the woman and the donor can be regarded as fertile, it is not essential to introduce a speculum, 1 or 2 c c

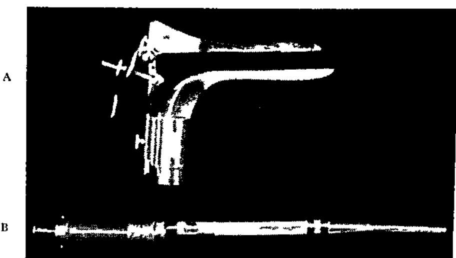


FIG 11 Instruments needed for carrying out Artificial Insemination
A Bivalve speculum B Plastic cannula fitted to ordinary record syringe

resort to which almost invariably implies some impairment of fertility on one or both sides Indeed, A I H —except when it is used to overcome mechanical difficulties on either side—seems to offer very small chance of fertilization, and certainly does not appear to be any more effective than normal coitus Naturally its results can only be appraised if the cases for which it is used are selected with scrupulous care If it is adopted in all types of subfertility it will be overvalued, for it will then be credited with pregnancies which in fact resulted from ordinary coitus and were perhaps favoured by the measures adopted for the treatment of one or both partners When however it is reserved, as it should be, mainly for cases in which the quality of the semen seems below the normal for conception, or for genuine cases of cervical hostility, the results in our experience are extremely discouraging

2 PSYCHOLOGICAL, LEGAL AND MORAL ASPECTS

The problems of A I D, as discussed for instance at conferences on the subject or in the correspondence columns of the medical journals, are curiously remote from those that actually arise in practice Thus, to take an obvious example, the doctor is not faced with the problem of overcoming psychological resistances to the procedure, though admittedly in many persons such resistances are deep and decisive His task is rather to dispel over sanguine expectations, to point out the difficulties, moral, legal and psychological as well as technical, which his patients may have failed to realize, and to ensure, as far as lies within his power, that if in the end they maintain their resolve and decide that A I D is the most acceptable solution to their problem, they will do so with no illusions as to the potential consequences of their joint undertaking The point is worth emphasizing, if only to dispel misapprehension about the circumstances in which the problem of A I D ordinarily arises between the doctor and patient Couples to whom the idea of insemination by donated semen is abhorrent —and there are many such—or who regard the procedure as a form of adultery, or who without reflecting too deeply upon its implications would reject it on religious grounds, do not come to the doctor to change their minds for them They either resign themselves to childless marriage or seek what satisfaction may be found in the adoption of children

Similarly the perplexing moral and psychological pro

of semen is simply deposited in the posterior fornix and the woman should then if possible rest in the horizontal position for half an hour or more If, on the other hand, it is necessary to conserve semen (as, for example, in A I D when one specimen of high fertility is to be used for several women), then the cervix should be exposed with the patient in either the left lateral or the lithotomy position and about 0 25 to 0 75 c c of semen introduced slowly and gently into the cervical canal In A I H cases, when the procedure is adopted either because the husband's semen is of poor quality or because there is cervical hostility, or both, it is necessary to introduce the semen as near as possible to or just through the internal os and again only a small volume (0 25–0 5 c c) can be used with advantage

Timing of Insemination

The timing of the insemination in relation to the menstrual cycle is of course of extreme importance and is in fact the major difficulty in the procedure The wife should be instructed to keep a menstrual calendar and to record her morning rectal temperatures and any subjective symptoms of ovulation (see page 84) This will help to narrow the likely days down to a small number, and one or two inseminations should be carried out each month during these theoretically fertile days at two- or three day intervals For how many months it is necessary or desirable to attempt insemination in any given case depends on the degree of fertility both of the recipient and the donor and on the persistence of the woman and the doctor On theoretical grounds, because of the slight injury to the cervical tissue which occurs when intra cervical insemination is attempted, the risk of producing sperm antibodies in the recipient by repeated insemination must be borne in mind, but so far there is little or no evidence to support this possibility

Results of Insemination

In a short series of successful cases the number of inseminations needed to induce conception ranged from 1 to 25, the attempts were made on most days of the cycle between the 5th and 25th days but all the successful inseminations were carried out between the 9th and 15th days As is to be expected the results of A I D , which usually involves the introduction of highly fertile sperms into a potentially fertile woman, are far and away better than those of A I H ,

marriage and of how far this may be endangered by childlessness—in short, all that goes to make up the doctor's experience must ultimately decide whether the request for A I D, no matter how urgently pressed, should be acceded to or denied

There are some circumstances in which the issue cannot for a moment be in doubt If for instance the request comes from an unmarried woman, A I D is utterly unjustifiable even if the doctor has no reason to suspect an ulterior motive, and in fact A I D has sometimes been sought by unmarried women in the hope of using the ensuing pregnancy as a means of forcing a reluctant lover into marriage Equally there can be no question of A I D if the doctor is not satisfied about the genetical equipment of the female partner, or if there is a hint of conspiracy to secure the inheritance of title or estates which, in default of progeny, would pass to others Even if the doctor is quite certain that there is no intention or possibility of defeating the ends of the law, it is still his duty to explain the legal problems of A I D to the couple and to satisfy himself that both partners fully understand the difficulties that may possibly arise for them or the progeny These questions are further discussed on page 118

Apart from these and like contra indications, each case should be considered on its merits The procedure should be carried out only if the doctor is satisfied that A I D would in fact be the best course, psychologically and morally, and even then only under the safeguards discussed on page 112 It is worth adding that in the view of the Family Planning Association A I D is suitable in only an exceedingly small number of cases It recommends that applicants should be advised to consult with specialists, believing that it is not within the province of the Family Planning Association Clinics to offer the necessary advice

Psychological Objections

In practice these prove far less serious than might be surmised from public discussions on the subject, presumably for the reason already mentioned, that persons with a psychological resistance to A I D find some other way of satisfying their parental needs It has been suggested that the husband might find it very difficult to reconcile himself to his wife's having a child not his own, with consequent danger to the stability of their marriage Actually the reverse is often the case, for there can be no doubt that

blems which, in discussions on the subject, arise for the doctor or for the potential donor of semen solve themselves in practice in a simple and satisfactory manner Doctors who object to A I D , or who cannot make up their minds about its ethical justification or psychological consequences, do not adopt the procedure, and if asked about it by their patients, they will usually and, granted their premises, rightly exercise their influence against it Men who regard masturbation as sinful in all circumstances, or who believe that the ultimate risks of A I D outweigh its immediate advantages, do not volunteer to become donors In short, the situation as it normally arises concerns three groups of persons—the couple who desire A I D , the doctor who has satisfied himself that the desire is deep felt and shared by both partners of the marriage, and the donor who believes that by making his sperms available he can contribute to the solution of a tragic human problem, and the only serious question that arises is how these three groups can collaborate to the greatest advantage and with the least risk, immediate or remote, to the couple or the potential progeny

The Doctor's Responsibility

It should be said straight away that for the doctor the first and most vital problem is whether or not the couple qualify, temperamentally and in sense of responsibility, for the onerous undertaking of becoming joint parents to a child who would in fact be the offspring of only one of them There must be no question of eagerness on the one side and reluctance on the other, none of persuading a couple, or one or other member of it, of the desirability of a course about which there may be even faint doubt On the contrary, as suggested above, the doctor must rather satisfy himself that the couple not only desire A I D but fully understand the implications of what they desire Are they sure that they both want a child produced by donated semen? That there has been no pressure by one partner on the other against a resistance that may emerge again when it is too late? That their parental desires could not equally be satisfied, and with less risk, by adoption? It is impossible to give detailed guidance on the conduct of the preliminary consultation The doctor s clinical instinct, his judgement of the demeanour of the couple, their mental balance, sincerity, sense of responsibility and capacity for parental love, his estimate of the stability of their

presumably it would be easy for an unscrupulous doctor, on the pretext of carrying out A I H , to mix fertile semen from a donor with the infertile semen obtained from the husband This, however, is not an argument against A I D , though possibly it offers reasons for hedging the procedure in with every possible safeguard, all human expedients, however beneficent in purpose, may be turned to evil ends and there is no reason to believe that A I D is any exception

The Medical Defence Union, in a memorandum on the legal aspects of artificial insemination, particularly warns the practitioner of the need for protecting himself, as far as possible, against charges of negligence or conspiracy It urges that he must exercise every care not only in carrying out the procedure but in the selection of the donor, and further, in view of the possibility of conspiracy in cases involving the inheritance of titles, estates or funds, that he should safeguard himself by obtaining an assurance in writing 'that the birth of a child by the wife would not defeat claims of any persons contingently interested in default of their having issue" It also recommends that in all cases the request for A I D should be confirmed in writing by both the husband and the wife, and that the procedure should in no case be adopted for couples under twenty one years of age The documents should be witnessed by some responsible and impartial third person to whom the practitioner has explained exactly what is involved and the reasons for obtaining the signed statement The memorandum also points out that although the courts have not yet been called upon to decide whether, in a legal sense, A I D is equivalent to adultery, the doctor would do well to ensure that neither his patients nor the donor were involved in divorce proceedings As a further safeguard it suggests that the written consent of the donor's wife should also be obtained

- The legal difficulties concerned in the registration of the progeny seem at the moment to be insurmountable The child would only be legitimate if the husband were registered as the father, though to do this would in fact be perjury It seems possible, however, that changes in the method of birth registration will in future render this problem less serious than it is at present

Biological Aspects

Of the possible biological consequences of A I D two in particular must be considered first, that it may sometimes

many marriages have been saved by A I D The fact that the husband has not prevented the realization of his wife's fondest wish usually strengthens, rather than weakens, the bond between them, and indeed in many cases it is from the husband not the wife that the suggestion of A I D first comes A man who loves his wife cannot but feel distressed by the knowledge that it is through him that her desire for maternity is frustrated Such a man seldom objects to A I D if his wife desires it and it is surprising how soon he may forget that the child is not his own An interesting confirmation of the success of the experiment may be found in the fact that many couples who have had a child by A I D return after an interval for the procedure to be repeated What they have gained may be discerned not only in the satisfaction of the wife's maternal instincts but in the change produced in the atmosphere of the house by the presence of the child

It is sometimes argued that for the husband to condone A I D is tantamount to his permitting his wife to take a lover, and admittedly among those who object to A I D on religious grounds there are many who can discern no fundamental difference between this procedure and adultery But for the couple that makes the request the distinction between the two is decisive Adultery involves a deep emotional relationship, the intrusion of a third party between the husband and the wife, the probability if not the certainty of the break up of their marriage A I D, by contrast, is as impersonal as a transfusion from a blood-bank, and the relationship between the recipient and the donor is about as intimate Neither the wife nor the husband knows the identity of the donor, he does not know theirs This precaution is essential and invariable (see page 113) And in such circumstances, whatever may be the teaching of some religious denominations on the subject, or whatever views may be put forward by legal authorities (and in fact these are sharply divided on the matter), for the couple themselves A I D offers an enrichment of their marriage whereas adultery would disrupt it

Legal Aspects

Because there are no precedents, A I D presents difficult problems for the lawyer Obviously it could lend itself to fraud and abuse, especially where matters of inheritance are concerned The means by which the wife has conceived are known only to the doctor and the couple, and

according to the Church, was ordained for two purposes which must not be separated—namely, the procreation of children and the satisfaction of sexual needs A I D is held to violate this fundamental principle by pursuing the procreative end alone But in fact the Anglican Church, in permitting the use of birth control under certain conditions, has already sanctioned the separation of the two ends of marriage

These arguments are stated merely as examples of the polemics that encompass this most difficult subject It is unlikely that they would carry the slightest conviction to anybody who does not share the deeper assumptions on which they are based All that can be stated with certainty is that in this matter everyone must be guided by his own feelings or convictions or by the ruling of his church Those who believe that neither A I H nor A I D is permissible in any circumstances must of necessity use their influence against its adoption But the fact remains that many medical men and women who have personal knowledge of the strength of parental instincts and of the happiness that follows the birth of a child in the childless home favour artificial insemination in properly selected cases, without compromising in any way with their moral principles or religious faith

result in the dissemination of harmful recessive characters —i e when apparently healthy carriers of genetical defects act as donors in a large number of cases, and secondly, that it may conceivably result in incestuous unions between the progeny of different mothers by the same donor These risks will remain small as long as recourse to A I D remains, as at present, comparatively rare, but if it came to be widely practised they might assume serious proportions One obvious safeguard would be to set a strict limit to the number of cases that could permissibly be inseminated by any given donor, another, which though not practicable at present would have to be considered if the practice became common, would be to institute a register recording the paternity of all children conceived by A I D Meanwhile, the doctor faced with a request for A I D has no alternative but to weigh its potential advantages in the case before him against its hypothetical biological dangers And if he decides in favour of A I D he must exercise that care in the selection of the donor enjoined in the section dealing with technical aspects of the subject (see page 112)

Moral Aspects

Any survey of this most important aspect of A I D is bound to be unsatisfactory The fact must be accepted that between those who feel an instinctive aversion to this method of solving the problem of childless marriage and those, not less high-minded and not less concerned with ultimate moral values, who do not, there is a sharp division that cannot be bridged by discussion, no matter how scrupulously or dispassionately carried out Yet some attempt to state the issues is essential—perhaps more than ever in an age which is uninspired by a common faith and lacking in a common conviction on the relation between *ends and means*

One religious denomination—the Roman Catholic Church—has spoken unequivocally on the subject It will condone neither A I H nor A I D, for both involve the sin of masturbation, and the latter, in the view of the Church, of adultery too The special committee nominated by the Archbishop of Canterbury to examine the problem in its published statement (1948), sanctioned A I H, but it was unable to extend its approval to A I D One of the theological arguments that have been advanced against this procedure turns on the fact that marriage,

PART TWO

CLINICAL CONTRACEPTION

CHAPTER ELEVEN

THE SCOPE OF CONTRACEPTION IN GENERAL PRACTICE

WITH the spread of contraception through all social groups, questions concerned with its application must now inevitably arise in every class of general practice

The following chapters are therefore concerned in part with a clinical survey of contraceptive methods in popular use about which patients may sometimes seek expert advice, and in part with a more specialized problem, namely the choice and fitting of the various types of contraceptive occlusive caps The need for the requisite technique arises not only in private practice but in the growing number of clinics which are being established by local authorities and by such bodies as the Family Planning Association Up to date lists of these clinics are given on pages 216–26

Sexual Maladjustment and Functional Disorders

Of the medical aspects of contraception, there is one which calls for special discussion

It is fairly common knowledge, now, that faulty sexual adjustments may precipitate an acute anxiety neurosis Most people are liable to experience occasional anxiety symptoms, such as the diarrhœa, palpitation, etc , which occur at times of strain But most can control these well enough, unless faced with some abnormal strain such as repeated sexual frustration Many cases of nervous breakdown are finally caused by some chance interference with the satisfactory completion of the sexual act

Such interference may arise from intrinsic causes, for some degree of psychical impotence or frigidity is extremely common, or from extrinsic causes, such as incompetence in the married partner or *the use of unsatisfactory methods of contraception* Thus, a very common finding is that the husband disturbs the harmony of coitus by withdrawal (coitus interruptus or "being careful"), with the result that

capable of reaching a "climax" it is necessary for her health that she should do so The patient will often reply that she never gets any satisfaction at all, as she has been "holding back", regarding this as an additional safeguard, she adds that she is no longer interested in such things It may be possible to point out how many of her symptoms have appeared since the beginning of this practice, and to discover whether her husband also shows signs of nervous strain

Although many patients make light of the importance of sexual matters to themselves, under the impression that it is more becoming to do so, they soon abandon this attitude when they find that the physician is serious in his approach to the subject The practitioner who has thus gained the confidence of his patient can give a very real service not only to her but often, indirectly, to the other members of her family

It is a curious fact that so many obstetricians ignore the importance of contraceptive instruction In private practice such disregard may cause little more than inconvenience to the patient, for she can usually seek advice elsewhere, but in hospital practice to withhold contraceptive advice may lead even to tragic consequences It is by no means unusual to hear it said at a contraceptive clinic, "The doctor told my husband that if I get pregnant again I shall lose my life—but he never told us what to do" Patients are continually being discharged even from leading hospitals with warnings of this sort Equally irrational is the practice of discharging from hospital patients who have been treated for self inflicted abortion without giving them advice on contraceptive precautions Since few patients dare approach the staff in such a matter, it means that the principles of prophylaxis are entirely disregarded

Every hospital authority, whether doctor or nurse, who treats a patient in this way is throwing a tremendous burden upon the wife and husband The woman may return to her home and attempt a lifelong abstention from sexual intercourse More often she simply postpones marital relations until she dare no longer do so for fear her husband should be unfaithful Sexual intercourse in such circumstances, whether it is followed by pregnancy or not, must inevitably arouse the woman's resentment and the man s anxiety and remorse

The present more enlightened attitude of the medical profession towards contraception is doing much to over-

one or other partner is disturbed, psychically or somatically or both, by inadequate attainment of the impending orgasm In such cases the mere prescription of a suitable contraceptive device often produces incalculable benefit

The assurance offered by many practitioners, that they are seldom if ever asked for such advice, betokens a most unsatisfactory relationship between the medical profession and the public Many women are firmly convinced that their family doctor will be unsympathetic to birth control and hence will seldom seek his advice and risk a rebuff Even when they are not rebuffed they very often receive advice that is extremely misleading Thus, patients often volunteer the information that they cannot be pregnant because they used a method which, according to their doctor, was infallible—this "infallible" method being perhaps the use of some soluble suppository as the sole contraceptive device It is not of course necessary that every general practitioner should be expert in the fitting of occlusive caps, but it is most desirable that he should have a clear idea of the relative effectiveness of different methods and know better than to tell his patients that any method is infallible

The reluctance of patients to broach the subject of contraception will often throw the obligation to do so on the practitioner himself, and in this he should usually succeed without running into difficulties with prejudiced patients If, for instance, the patient's history and condition suggest the presence of anxiety neurosis, it is not difficult to discover her contraceptive habits by asking how many children, or pregnancies, she has had On her reply, one can say "And is that enough for you, or do you want a larger family?" If she says "No", she usually does so with emphasis It is then easy for the physician to ask "And do you know what to do to protect yourself?" Immediately the whole question is opened and the woman is only too glad to say she is trusting to such and such a method but is not certain as to its advisability, its risk, and so on

At this point it may be possible to explain to the patient that although a method such as "being careful" may have been effective for a while, it is very far from dependable, that it imposes a great nervous strain on her husband as well as on herself, and that expert opinion is against it Once the patient's confidence has been gained it is not difficult to inquire whether or not she is achieving satisfaction in spite of this method, or to explain that if she is

CHAPTER TWELVE

CLASSIFICATION AND ASSESSMENT OF CONTRACEPTIVE METHODS

CONTRACEPTION is concerned with preventing sperms from meeting the unfertilized ovum This presents a very difficult problem, for the ejaculated semen of a fertile man contains two to three hundred million sperms, most of them intensely active and competing to make their way up the female genital tract towards the ovum

The vaginal *p*H is considerably lower than that of the semen, and it is known that after a few hours in the vagina all sperms that remain there are virtually immobilized Unfortunately it is impossible to state the period more precisely, for the *p*H varies widely in different women and in the same woman from day to day Thus, during and after menstruation it is less acid than at other times It is probable that no sperm could effect conception after longer than about six hours in the vagina

The *p*H in the cervical canal, uterus and fallopian tubes, on the contrary, is either neutral or just on the alkaline side of neutrality, and here the sperms may remain active for many hours or even days The meeting place with the ovum is usually in the ampullary end of the fallopian tube, so that segmentation is well advanced by the time the fertilized ovum reaches and becomes embedded in the uterine mucosa

Classification of Contraceptive Methods

The methods which have been devised for circumventing conception may be roughly classified into the following groups

(1) The couple may abstain entirely from coitus

(2) Sexual intercourse may be confined to the phase of the cycle in which it is believed there is no ovum available for fertilization—the so-called "safe period"

(3) The semen may be prevented from entering the female genital tract—i e by coitus interruptus or by covering the penis with a sheath into which the semen is deposited

come ignorance and prejudice Local authorities are still slow, however, in making full use of the facilities permitted by the Ministry of Health for the provision of contraceptive advice, and until contraceptive service is available for all working-class women, the family practitioner should regard it as his responsibility to advise his patients about the efficacy of the methods they may be using, or to give them suitable instruction, or to refer them to the nearest clinic where such instruction is available

The practitioner with knowledge of these important aspects of family health will soon find what a vast amount of unhappiness is caused by ignorance and sexual maladjustment, and how much of this it is in his power to relieve by a little sympathetic and practical advice [1]

[1] Excellent works are available on the subject *Parenthood Design or Accident* by Michael Fielding (Williams and Norgate paper 3s cloth 4s) is suitable for medical and educated lay readers *Birth Control* by Helena Wright (Cassell 1s) is excellent for the wider public and a very simple short statement *Practical Advice on Family Spacing* can be obtained (8½d post free) from the Family Planning Association 69 Eccleston Square London S W 1

obtained by the use of two or more measures together This fact is not widely recognized by the public, most couples choosing one method and trusting to it alone Thus, among 100 consecutive patients referred for advice to the Municipal Birth Control Clinic of Ealing, the following methods were found to have been practised

Withdrawal	57
Use of a sheath	33
Chemical contraception (by means of soluble pessaries)	9
Post coital douching	9
Abstention	5

It will be evident that some of the couples had used more than one method, though not simultaneously, but on the other hand 15 of the 100 couples had not previously attempted any method at all In one family the wife, an eclamptic, had had 11 pregnancies, the last 10 having been conceived in spite of withdrawal, which the couple were still practising believing it to be better than no method at all All the couples may be taken as representative of the population in a poor working class area of the district, the women had all been referred by medical officers for reasons of ill health, and were probably not more experienced or more interested in birth control methods than the average person

The technique taught at most birth control clinics involves the use of a mechanical device (an occlusive cap) covered with a contraceptive paste and sometimes supplemented by a chemical suppository, or a sheath in conjunction with a chemical spermicide For patients who are prepared to take a slight chance the simplicity of a single contraceptive device may appear to offer overriding advantages

The practitioner consulted about these methods should be able to give a fair idea about their probable efficacy and to know which of them may suitably be recommended Among the questions he must be prepared to answer is whether any method could prove injurious to the woman's health, or, should pregnancy inadvertently result, to that of the child Such risks to health as may be associated with any given method will be referred to later in detail, but apart from irradiation, referred to above (see page 130), there is no evidence whatever that contraceptive practices could damage a fœtus conceived in spite of precautions It is after all reasonable to suppose that of the many

(4) The cervix may be covered by an appliance (occlusive cap) designed to prevent the direct deposition of sperms in the cervical orifice

(5) The sperms may be destroyed within the vagina by chemical means—e g contraceptive suppositories or jellies

(6) The semen may be removed from the vagina by means of a post coital douche

(7) Mechanical appliances may be fitted into the cervical canal (stud or wishbone pessaries) or into the uterine cavity (Grafenberg ring), allowing sperms to reach the ovum and possibly to fertilize it, but by their presence preventing the nidation of the fertilized ovum and thus the occurrence of pregnancy

(8) The production of ova may be inhibited by irradiation with X rays or radium

(9) Spermatogenesis may be inhibited by the application of heat to the testes

(10) Immunity to sperms may be stimulated by the injection of semen with the consequent production of so-called spermatoxins

It need hardly be said that these methods are of most unequal value and that some indeed are dangerous, ineffective or both Irradiation, for example, when it does not produce complete sterility, increases the mutation rate and may result in the birth of defective offspring The production of spermatoxins is uncertain and there is no way of assessing the duration of the immunity or of the number of injections required for its production Attempts to arrest spermatogenesis by heat have given variable and undependable results The use of intra cervical and intra-uterine appliances will be discussed in some detail later (see page 185), but it may be stated at once that methods involving such expedients are extremely hazardous and have been condemned by most competent authorities In any case these last expedients are uncommon, and the only ones which merit detailed consideration, on the grounds of their prevalence or utility, are those set out in paragraphs 1 to 6 in the above classification

Effectiveness and Risks of Common Methods

Before proceeding to a detailed discussion of contraceptive devices and methods, it is well to state that even among those that have a useful part in practice there are none that can alone give complete security against undesired conception, but a very high degree of security can be

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millions of competitors for the fertilization of one ovum, the victor is not likely to be an extrinsically damaged sperm Furthermore, experience has shown that the use of such appliances as the sheath, or of the occlusive cap with a suitable suppository, does not in any way adversely influence the woman's health or fertility

Notwithstanding all this, it is the duty of the practitioner to point out to couples that fertility decreases considerably with increasing age, and that, since a nulliparous woman has no chance of estimating her own fertility, she would be most unwise to postpone her first pregnancy for long, unless her age were at the most in the early twenties The relation between contraception and fertility is indeed of such importance that it should always be discussed with patients at the first consultation It should be pointed out that fertility is likely to diminish from the late twenties onwards, but at the same time the reassurance should also be offered that, provided intra uterine appliances are not used, early marriage with contraception will no more jeopardize the chances of pregnancy than would the simple postponement of marriage until childbearing becomes economically possible

Green-Armytage (1943) and his co workers have recently offered experimental evidence for the view that the presence of semen in the vagina is necessary for the full development of hypoplastic genitalia, but Sharman (1945) and others have completely failed to confirm these findings, which in any case must be regarded as inherently improbable The matter was well summed up in a leading article in the *British Medical Journal*[1] in the statement that "there is little likelihood that contraceptive measures of the kind generally employed at present have any tendency to impair the potential fertility of couples "

It seems probable that the so called dangers of contraception should be looked for, rather, in the fact that many couples have no active desire for parenthood until they have attained it Nature, not having foreseen contraceptive practices, has ensured parenthood only by being lavish with sexual desire And many of the finest potential parents remain unaware of the deep pleasures of parenthood until an accidental pregnancy reveals their existence

A final word may be said about contraception towards the end of reproductive life Since pregnancies have been known to occur at the menopause, even twelve months after

[1] March 23 1946

the cessation of menstruation, it is desirable to continue contraceptive measures for one or two years after the last period The fear of pregnancy causes much mental distress to some women at the climacteric, a fact which should be borne in mind by the physician when dealing with meno pausal disorders

Therapeutic Sterilization

For cases in which pregnancy would always be dangerous to health or life, sterilization offers a permissible and more certain method of avoiding pregnancy than contraception It can relieve the patient both of anxiety and of the trouble and expense of repeated contraceptive precautions In most cases it may be best for the woman to employ contraceptive measures, but on the understanding that if they should fail therapeutic abortion will be performed by hysterotomy and the fallopian tubes tied at the same time Such a woman should be sterilized if the abdomen happens at any time to be opened for other reasons, and similarly the woman who must always be delivered by Cæsarean section could be sterilized when a further pregnancy would be contra indicated

CHAPTER THIRTEEN

COITUS INTERRUPTUS, "HOLDING BACK" AND ABSTENTION

Coitus Interruptus

This procedure, also known as "withdrawal" or "being careful", is the most widely used birth control method in the world and probably the oldest Yet though its efficiency must have been questioned since time immemorial, it is only in recent years that it has been held in serious disrepute

From the point of view of effectiveness the method must be considered hazardous Its aim is simple enough to obtain sufficient stimulation for orgasm but to withdraw the penis from the vagina just before the emission But this does not take account of the insufficiently recognized fact that the pre ejaculatory fluid may contain active spermatozoa Thus Abraham Stone, in an examination of specimens of mucus that appeared at the male meatus during erection, found spermatozoa in 5 out of 24 specimens from 18 subjects

A more commonly recognized defect of the method is the difficulty of withdrawing the penis in time For some men the timing of this act is impossible, for others by no means too difficult, but even for them the control and skill required will vary with temporary conditions such as fatigue, alcoholism, and the intensity of emotion during the coital act Taking these factors into consideration, no man should be regarded as skilled in the method until he has practised it *consistently and successfully*, and even then he must be warned that all his efforts may be vitiated by the presence of sperms in his pre ejaculatory mucus

It is understandable that a method so widely known, which costs nothing and requires no preparation, should some time or other have been used by most couples And although large families are often found in which all the children have been conceived in spite of its application, the parents are probably right in believing that their care has

gone some way towards spacing the children, and that perhaps even more pregnancies might have occurred without it

It has already been stated that any method of contraception which interferes with the continuity and satisfactory completion of the sexual act is liable to precipitate or accentuate a condition of nervous strain (anxiety neurosis) which, while not endangering life, may very seriously impair health and happiness Unfortunately the recognition of anxiety neurosis may involve difficult diagnostic problems, and only too often its manifestations are overlooked or misinterpreted It is perhaps an advantage that examining boards are nowadays giving increasing attention to the subject, for this means that it is only a matter of time before the syndrome is studied in medical schools and accepted as a contributory factor in many varieties of ill health

The practitioner on the lookout for the condition will find many examples in his practice for instance, in newly married women with insomnia, indigestion and lassitude, in whom (as a carefully elicited history will show) the full sexual orgasm has not been established, often as a result of faulty sexual technique which can be remedied by proper advice, or equally commonly in couples whose symptoms are directly attributable to the long continued practice of coitus interruptus

It has been suggested that in the male this practice may cause direct injury to the genital system, such as prostatic enlargement, congestion of the seminal vesicles, etc But this view is not generally upheld, and it is probable that trauma should be looked for rather in the nervous system than in the genital tract

Withdrawal before ejaculation causes some deprivation of pleasure to the man, as well as the strain (very severe for some) of keeping control throughout a process which should normally be spontaneous and completely uninhibited Some men can apply such restraint even for many years with apparent impunity, but others quickly show signs of less satisfactory health or temperament

The wife s reaction too is variable Withdrawal seems to produce little or no ill effect in women able to reach their orgasm either before or in spite of the interruption of coitus, or in those who feel able to trust their partner and have no share in the responsibility of timing withdrawal Again, in women who are equally frigid whether coitus is

interrupted or not, the practice can hardly affect the difficulties with which they have already to contend

"Holding Back"

There is, however, a further restraint to be considered It is commonly held, though *quite erroneously*, that if the woman does not experience an orgasm the likelihood of conception is much diminished Some women are able to exert so much control as entirely to inhibit their orgasm This practice is called "holding back" and its value is so much taken for granted by many women that, *unless the practitioner refers to it specifically*, he may recommend a change from an unsuitable method of birth control to a better one and yet leave the woman practising her own restraint believing it to be an additional safeguard It can be said with certainty that holding back is quite ineffective as a contraceptive measure and is always detrimental to the women who adopt it The very fact that they have to exercise this restraint proves that they are capable of orgasm and desire it The repeated frustration leads in many instances to frigidity, and an acquired frigidity of this type must inevitably injure emotional or physical health

The direct physical results of holding back are of gynæcological importance The exact process of orgasm in the female is less simple than in the male, and is associated with involuntary contraction of groups of muscles, mainly of the vagina, cervix, uterus and pelvic floor During coitus the entire genital tract becomes tumescent, but after the orgasm detumescence takes place, very similar to the process in the penis of the male Failure to achieve an orgasm leaves these organs in a state of congestion which is necessarily greater in a highly stimulated than in a frigid woman With constant repetition of these events, a condition of chronic pelvic congestion becomes established the ovaries become hypersensitive, causing discomfort or even pelvic pain, reflex backache is common and leucorrhœa and menorrhagia are frequent concomitants

It is strange that the parallel syndrome in the male is so much more widely recognized Aching testicles and sacral backache are known to be relieved by orgasm, even by nocturnal emission The equivalent reaction in the female is incomparably more common, but because women know so little and say even less about their sexual reactions, gynæcological departments are continually used by patients

who hope to find, in a bottle of medicine, relief from the results of unsatisfactory coitus In the circumstances it is perhaps fortunate that ergot controls menorrhagia, and "mist alba daily may relieve pressure from the pelvic colon upon a hypersensitive ovary, and there are always the bromides to compensate in some measure for deficiencies in our medical and psychological equipment

Abstention

Continence must be considered partly because, like safe-period intercourse (see Chapter 15), it has been sanctioned as an alternative to the use of contraceptive appliances by some religious denominations, and partly because there are some couples who regard it as the only morally permissible way of limiting the size of their families

The problem is a difficult one There can be no doubt that in mankind the sexual impulses are far greater than would be required for the reproduction of one child every twelve or eighteen months The urgency of these impulses varies of course in different persons, according to their health and endocrine balance, and probably it depends as much on psychical as on physiological influences

We may consider first how continence would affect the newly married couple In many instances financial difficulties or housing problems will have forced them either to postpone marriage for many years, or to marry early but postpone starting a family, in order that the wife may be able to carry on her employment It is common knowledge that there are many personal and social disadvantages associated with very long engagements, and early marriage with the postponement of children is, for most healthy young people, the more acceptable alternative What, then, can be their plight if they are denied the full use of contraceptive measures? Even to day it would be hard to find a better statement of the problem than that offered by Lord Dawson of Penn in 1921

> Imagine a young couple in love with each other being expected to occupy the same room and abstain for two years The thing is preposterous You might as well put water by the side of a man suffering from thirst and tell him not to drink
>
> And further than that if the efforts to abstain are seriously made the strain involved is harmful to health and temper—if the efforts do not succeed the minds of husband and wife are troubled by doubts and anxieties which are damaging to their intimate relationships

These views are amply *confirmed in the day to day* experience of the consulting room and birth control clinic It is the poorest people, living perhaps in one room, with no opportunity of privacy or of separation, to whom abstention is likely to be most distressing A clinic patient who already had six children, and whose husband had been unemployed for two years, spoke simply of their sexual life "Why, doctor, it is the only happiness we can afford"

The effects of abstention, or the efforts to achieve it, may be no less disastrous for middle-aged couples in whom, after years of marriage, the coitive impulse is usually less urgent Most people who are living under the intimate conditions of marriage find that sexual intercourse is an important factor in the maintenance of a harmonious marital relationship Its accomplishment brings a recurring sense of physical and psychological well being, and a reassurance of being loved, of potency and self esteem To many people the value of this reassurance may altogether outweigh the purely sensual pleasure of the act There is indeed much truth in the view sometimes expressed, that in a civilized society coital acts are performed more often for the attainment of reassurance than for the fulfilment of mere sexual desire

Thus, the physician who recommends abstention should realize that he may be inflicting a burden far greater than would be involved in the mere deprivation of sexual pleasure He must face the fact that the efforts to act on his advice may produce symptoms of anxiety neurosis, either in the form of functional ill-health, or in disturbances of temper or disposition

So far we have been concerned with the reactions of the average man or woman, but an important minority exists *(often among most cultured and outstanding people)* in whom the sexual instinct has become altered in its development, so that its adult manifestations are unusual, indeed, it may be so repressed that normal desire is wholly absent Persons of this type cannot easily understand the sexual feelings and needs of others, and if they happen to be in a position of influence (e g as teachers, doctors or ministers) their advice, which must inevitably be biased by their own experience, may prove harmful to more normally constituted people

Among the opponents of contraception there are some who feel that any artificial interference with the sexual

process is "unnatural" and repellent Prejudices concerning the sexual organs and sexual intercourse are widely diffused among civilized communities, and since they are deeply felt it is hardly possible to dispose of them by mere argument or persuasion Occasionally those who hold such views may be brought to agree that an artificial contraceptive appliance in the vagina is no more unnatural than a denture in the mouth, but usually they are unable to understand that everyone else does not share their repugnance and their disapproval

Not infrequently the problem arises in a special form, when only one of a couple wishes to abstain, either from religious conviction against birth control or from disinclination to coitus based on some individual inhibition In such cases the decision may produce great unhappiness, and deep unspoken resentment in the deprived partner The situation is particularly difficult when a woman with average sexual needs is married to a reluctant husband It is rarely that a woman can bring herself to acknowledge greater sexual desire than her husband is willing or able to satisfy, with the result that more often than not the husband remains unaware of the difficulties he is making for his wife

Fxplanation, and advice on contraception, may help some ill adjusted couples, provided that their abstention has been imposed on them by external circumstances and has not arisen as the expression of deep rooted dislike of sexual intimacy Where such dislike exists it may sometimes be resolved by the help of a skilled psychologist

In dealing with all such problems it should be borne in mind that it is always unwise to urge a particular form of sexual behaviour on another person, for the sexual life of every individual is intimately bound up with his physiological and psychological needs and those of his partner The most the physician can generally attempt is to remove fear or ignorance where they contribute to unsatisfactory sexual adjustment

CHAPTER FOURTEEN

THE SHEATH, DOUCHING AND CHEMICAL METHODS

The Sheath

This appliance is popular throughout the world Its great advantages are that it is cheap, potentially very efficient, and easily obtainable As well as affording protection against pregnancy, it may be regarded as a fairly good safeguard against venereal infection

The term sheath may be taken to include thick rubber washable sheaths, fine animal skins, and the more popular thin rubber condom, or "French letter' All these are made in sizes suitable for fitting over the erect penis They are put on before intercourse and the semen being deposited in the sheath, there can be no risk of impregnation if the sheath is perfect and correctly used In practice, however, *these ideals are not very often attained*

Sheaths when ready for use are rolled like surgical finger-stalls and they can be unrolled over the erect penis very quickly The patient should be instructed never to allow the penis to enter the vagina without the sheath already in position Very few people realize that there may be some leakage of sperms long before emission, and that if *coitus is repeated after emission a sheath must be freshly* applied to prevent impregnation by sperms left on the surface of the penis After emission the sheath should be steadied with two fingers and withdrawn with the penis It is undesirable to wait too long, for, as the penis shrinks, the semen may leak round the edges of the sheath

Condoms are often made with a teat end to act as a receptacle for the semen, which might otherwise be forced up the sides of the penis and leak round the edges of the sheath Nevertheless, the teat end may be rather clumsy, and at the beginning of marriage is liable to interfere with the easy stretching of the hymen When condoms without a teat end are used, a small overlap should be left at the end for the reception of the semen, and if this precaution is taken the plain condom need cause *no uncomfortable*

constriction to the male and may perhaps be considered preferable In either case, before putting on the sheath, the air should be expelled from the teat or the overlap by squeezing with the fingers

One of the difficulties with the sheath, particularly at the beginning of marriage, is that inadequate secretion from Bartholin's glands may cause insufficient lubrication, with consequent discomfort to both partners and risk of tearing the delicate rubber In such cases a non greasy lubricant jelly (see page 229) should be smeared over the surface of the sheath—such a preparation being incom parably more efficient than vaseline, which, though popularly favoured, causes deterioration of rubber and for this reason alone should not be used with any sheath intended for repeated use

Occasionally it is desirable to place a very little of the lubricating substance on the inside of the sheath as well as the outside, though care must be taken not to use too much lest this should produce a tendency for the sheath to slip off during the coital movements Lubrication of the inside of the sheath is a particularly useful expedient in cases in which the use of the sheath results in excessive blunting of sexual sensation

It has already been pointed out that no single contra ceptive expedient is as effective as a combination, and for greatest security it is desirable that when the sheath is used the woman should also insert a soluble suppository before coitus This can easily be effected while the husband is adjusting the sheath For experienced couples an alternative procedure is to keep at hand some quickly acting spermicide, to be used in the event of tearing of the sheath This accident is usually evident immediately on with drawal, and the woman should cope with it at once either by prompt douching or by inserting a spermicidal jelly or suppository Should neither of these courses be practicable, the vagina can be rapidly cleansed by two fingers covered with soap, *which is an excellent spermicide*

It should be remembered that if a washable sheath is employed it must be thoroughly cleansed before the next coitus

These instructions, apparently so elaborate when set out in detail, are in fact not hard to master, and many couples are well content with this method for their permanent use If it were generally acceptable, contraceptive technique would present few problems and could ensure a very high

degree of successes, but in fact the disadvantages of the sheath are to many people insuperable

Some Disadvantages of the Sheath

From the man's point of view one of its chief defects is that even the finest cover over the penis may produce some blunting of sexual sensation This is particularly so in uncircumcised men On the other hand, it should be realized that what to some men is a defect may for others be an advantage, particularly for those whose ejaculation is too precipitate and for whom blunting of sensation facilitates the prolongation of coitus

This of course applies only if erection is normal A large proportion of men who suffer from erratic or incomplete erection cannot use the sheath at all, and for many couples the interruption while the sheath is being adjusted is to say the very least tiresome On this account it is unwise to urge the method on apparently unwilling patients, for many men are most diffident about admitting sexual difficulties and would prefer even to be thought obstinate for their refusal to co operate

From the woman's point of view the physical drawbacks are usually slighter than from the man's In fact many women cannot tell whether a condom is being used or not, though this is certainly not true of all There are, however, many women who intensely dislike knowing that a sheath is used, and there are also couples who value the intimacy of complete genital contact very highly for purely emotional reasons, as do many women the presence of semen in the vagina

It is doubtful whether wearing a sheath is likely to cause sufficient interference with sexual feeling to precipitate an anxiety condition in either the man or the woman, provided that they do not actively dislike the method, but where it produces disturbance or interference with the orgasm in either partner, it should obviously be changed on purely medical grounds

Indications for the Sheath

In general, the indications for the sheath may be set out as follows

(1) For couples for whom pregnancy would be disastrous For such couples a reliable sheath (provided that the husband can be depended on to use it correctly)

supplemented by a contraceptive jelly or suppository will give the highest degree of security

(2) At the beginning of marriage, when the woman has not learnt the use of an occlusive cap

(3) For those who are unable to secure personal instruction on the fitting of such a cap

(4) For women after childbirth until the cap has been refitted

(5) For cases in which for some anatomical or other reason the woman cannot safely be fitted with a cap

(6) In emergencies when the cap is not available

(7) In certain cases of premature ejaculation

(8) In cases in which there is risk of either partner transmitting venereal disease

(9) In cases in which the wife or husband has a strong aversion to the occlusive cap

Choice and Care of Sheaths

The choice of sheaths, their keeping properties and their price are matters of great importance Although there are many kinds on the market, only very few are consistently dependable Sheaths which appear intact to the naked eye may, on microscopical examination, prove to be riddled with holes Furthermore, rubber perishes rapidly, particularly if roughly handled, brought into contact with grease or kept in a warm place For this reason patients should be particularly warned against carrying sheaths about indefinitely in a pocket-book

Condoms

The traffic in ' French letters is scandalously corrupt Chemists can exploit the gullibility of their customers to an apparently unlimited extent They will sell for 10s 6d to one man, as the "best sheath in the shop", one which to another, in a different envelope, they will sell for 6d , and still make a good profit Moreover the chemist is under no compulsion to keep his stocks fresh, so that the customers, particularly in smaller shops, stand a real chance of getting sheaths so old that the rubber has seriously deteriorated The purchaser should insist on a make which bears a date after which the rubber will not be considered safe for use Dependable condoms are mentioned in Appendix 3, which sets out a list of contraceptives approved by the Family Planning Association The rubber of these condoms is fine and highly distensible, and each has passed a special high

pressure test It must be emphasized that the quality of many condoms advertised as "tested and guaranteed" leaves much to be desired, and for this reason preference should be given to preparations which have passed the scrutiny of expert bodies such as the Family Planning Association's Medical Committee

It is widely held that condoms, which being made from very thin rubber are meant to be used once only, are impractical for use in the tropics In fact they can be supplied packed for use abroad, and they can be posted regularly to any part of the world and depended on to retain their elasticity in the worst climates for at least a few weeks But whatever the guarantees offered with such products, patients should nevertheless be instructed to test them before use by inflating with air

Washable Sheaths

Washable sheaths are made of thicker rubber, and though less pleasant than the condom can be used again and again for several months On account of the thickness of the rubber and therefore its lesser distensibility, such sheaths are made in three sizes—small, medium and large—the small or large sizes being only rarely required Patients who use such sheaths should be instructed to put them, after use, straight into a receptacle full of water Later the sheath should be washed with plain water, or with soap and water, tested for possible leakages by filling with water or by inflation, dried, and powdered with French chalk Unfortunately, sheaths keep best if they are stored flat, although it is essential that they should be rolled before application The French chalk should be shaken off before coitus, for otherwise there is a risk of discomfort to the woman

General Conclusions

Of recent years some practitioners have been inclined to regard the sheath with disfavour, maintaining that the cap is a more acceptable device for both husband and wife as well as the more effective as a safeguard against pregnancy But this is by no means always so, for where the husband and wife have no objection to the sheath, its advantages are considerable Indeed, there is no safer or more simple method of contraception than the use of a good tested sheath with a soluble suppository inserted in full accordance with the practitioner's instructions

The Post-coital Douche

This practice is widely used in France, but is not so popular in Britain It necessitates the woman getting up from her bed immediately after coitus and thoroughly washing out the vaginal passage

Disadvantages of Douching

The disadvantages of this procedure are obvious First it is most uncertain, with an estimated failure rate of over 70 per cent The reasons for its fallibility are readily understandable, for if the semen is emitted against the cervical orifice, some sperms (which *in vitro* travel at an average rate of 3 6 millimetres a minute) will, even within a minute or two, have reached further into the canal than the douching solution can penetrate It has also been held that at the moment of orgasm some of the semen is aspirated directly into the uterus, but though this has not been established and appears improbable, the mere possibility, if only in exceptional cases, furnishes a further reason for the frequent failure of the method

Successful douching calls for skill and great care The rugæ of the vagina are intricate and there is always a chance that a few sperms will escape from a douche unskilfully administered, later to find their way up the cervical canal The disturbance of the whole procedure to the woman can hardly be overestimated It calls for activity and intelligent foresight at a moment when there is a physiological demand for complete rest and relaxation Thus, the use of a post coital douche produces in many women a disinclination for coitus and many husbands too are most averse to subjecting their wives to so objectionable an ordeal

Advantages of Douching

The advantages of the douche are mainly that it is cheap and accessible Once the requisite apparatus has been bought the method costs nothing, but unfortunately it is just the women who can only afford a syringe or douche-can and nothing more who have so few of the toilet facilities which its use demands In some cases, when there is a risk of gonococcal infection, a douche of potassium permanganate (5 grains to the pint) may serve as a prophylactic The method also has its value for those women, admittedly exceptional, who have a neurotic objection to semen in the vaginal passage Patients often ask whether

regular douching is necessary for health and cleanliness The answer most certainly is not as a routine

The practice of douching can be combined with the use of an occlusive cap, and is still so recommended by some experts Used in this way, the douche is delayed until such time as the woman wishes to remove her cap In cases in which, for any reason, it is not easy to retain a cap during the necessary eight post coital hours, such a technique offers manifest advantages

Technique of Douching

It is important that patients should understand the technique of douching The solution must distend the vaginal walls and thus obliterate the rugæ where the sperms may be protected Sufficient pressure for this purpose can only be attained by closing the vaginal orifice around the douche-nozzle, either by pressing it tightly on to the nozzle with the fingers, or, if a bulb or "whirling spray" syringe is used, by pressing the conical shaped shield around the vaginal orifice Excessive tension must not be employed, however, since this might force the solution past the cervical os into the uterus With the ordinary douche-can this possibility can be avoided by limiting the height of the can to not more than two feet above the nozzle, releasing the fluid when the vagina is full and then flushing the passage again With the whirling spray syringe the bulb must be pressed only between the thumb and forefinger, which can exert sufficient yet not excessive pressure When this appliance is used the solution is returned several times from the bulb to the vagina until the semen is thoroughly mixed with the douching fluid Especial care should be taken to clean the syringe thoroughly after use

Plain water is highly spermicidal, but usually a chemical of some sort is added to the douche Two simple household substances, very much more spermicidal than the popular dettol or potassium permanganate, are vinegar (a tablespoonful to a pint of warm water) or a lather of soap Both these materials are cheap and always to be found in the household It is only occasionally that soap solution causes smarting in the vagina, and in such cases the vinegar or plain water should be substituted or the vagina should be finally rinsed with plain water The douching fluid should in all cases be comfortably warm

It is well for the practitioner to bear in mind that while

it takes but a moment to advise douching, it is altogether a more lengthy matter to follow his recommendation The bidet is seldom installed in British bathrooms, there may be no hot water supply, and the bathroom and water closet are often separate The most comfortable time for douching is when the patient is in her bath and can use the syringe while lying down in warm water At other times most women find the procedure chilling, tiresome and laborious

Chemical Contraceptives

These are among the simplest and most popular of birth control devices They have their chief value in practice when used in conjunction with other contraceptives such as occlusive caps or sheaths, but very com monly they are adopted as the sole contraceptive precaution, with a failure rate that has been variously estimated but is usually fairly high

A useful classification of chemical contraceptives is into three main groups (1) suppositories (also commonly known as "soluble pessaries"), (2) semi fluid preparations such as jellies, pastes and creams, and (3) foam producing preparations The suppositories in their turn are of two main types, depending on whether the spermicidal agent is incorporated in a cocoa butter or glycerine gelatin base, and the foam producing preparations are available in a tablet form Unfortunately the Pharmacopœia does not contain any chemical contraceptives as such, so that the practitioner is bound to rely upon proprietary preparations (see Appen dix 3)

General Principles

Before considering the various types separately, it will be well to examine the general principles underlying their use For whatever the form the contraceptive may take—suppository, jelly or foam tablet—these principles are the same They involve the introduction into the vagina of spermicidal substances, preferably in a vehicle which serves both to disperse the spermicide (and thus to facilitate its contact with sperms) and at the same time to form an effective mechanical barrier across the cervical canal Thus, it is evident that the term chemical contraceptive, too rigidly applied, is a misnomer The spermicidal action of the so called chemical contraceptives in fact is only one of the attributes on which their value depends Besides this must be reckoned the barrier action of the dispersed

vehicle, which, in some preparations of this class, is far more important than their spermicidal action, fulfilling a useful contraceptive function

Suppositories

These preparations, usually cone- or disk-shaped, comprise a spermicidal substance in a cocoa butter or glycerine gelatin vehicle In either case the vehicle is designed to melt at slightly below body temperature, preferably within a very few minutes of the suppository being inserted into the vagina The mode of use depends on whether the suppository is employed as the sole contraceptive measure or in one of the approved combinations of measures If it is the former, all that is required is that the suppository should be inserted deeply into the vagina three to ten minutes before coitus, the woman remaining recumbent in order to avoid leakage of the melted vehicle The use of suppositories in conjunction with the sheath or the occlusive cap is described in the sections dealing with these methods

For many years the most favoured spermicides were salts of quinine, usually incorporated in cocoa butter More recently other substances have been employed, such as lactic acid, boric acid, salicylic acid and hexylresorcinol All these substances have their value, but their spermicidal activity varies with the *p*H of the vaginal contents and at the best is not very high In fact, it may be assumed that the effectiveness of the preparations into which they are incorporated turns at least as much on the barrier action of the vehicle—whether cocoa-butter or glycerine-gelatin—as on the actual destruction or immobilization of sperms in the vagina

The most striking advance yet made in chemical contraception developed out of an investigation conducted over the period 1928–38 under the direction of Dr John R Baker in the Sir William Dunn School of Pathology at Oxford This investigation, which involved a study of the scientific basis of chemical contraception, the evaluation of existing products, and the testing of many substances which had previously never been used as spermicides, resulted in the discovery of two compounds—phenyl mercuric acetate and phenyl mercuric nitrate—which appear to fulfil the requirements of the ideal spermicide In the first place, they are harmless to the tissues, secondly, they are the most spermicidal substances ever investigated, and thirdly, a most important attribute clinically, they are

active both in acid and in alkaline media The acetate has the further advantage that it forms the more soluble solution in water, and for this reason it was adopted in 1938 as the active principle in the contraceptive suppositories issued by British Drug Houses under the name Volpar (a contraction of the words "voluntary parenthood)

Volpar suppositories (or gels) are cast in the form of small flat disks, each weighing 2 5 grams, and dusted with sterilized starch granules to prevent the gels from sticking to each other or to the glass tube in which they are packed The vehicle is of the glycerine gelatin type, melting rapidly at body temperature and giving a fluidity favourable to rapid diffusion of the spermicide into the semen It appears probable that though this vehicle, like those of other chemical contraceptives, exerts a barrier action across the cervix, the efficacy of Volpar depends mainly on its phenyl mercuric acetate content In any case, this is now regarded as one of the most dependable of all available suppositories, whether used alone or in conjunction with other devices The fact that neither the active principle nor the vehicle injures rubber enhances its usefulness It is worth adding that the Volpar products darken the colour of rubber, but this phenomenon has no significance, though it is sometimes disquieting to patients

Of suppositories in general it may be said that their use calls for very little forethought or intelligence and does confer some security Even if the woman has omitted to insert the suppository before coitus, she can do so soon afterwards and the safeguard will still be better than none at all There are some women who have used suppositories throughout their whole married life, spacing their children exactly as they have wished, while in others the method has apparently conferred no protection at all Between these extremes can be found every degree of failure and success

It is too early to give reliable statistics as to the efficacy of the Volpar Gels employed alone with no mechanical barrier In clinic practice—from which statistics can readily be collected—such methods are seldom chosen because most patients attending clearly require the fullest possible precautions Some years ago figures were collected concerning a commercial "quinine pessary in a cocoa-butter base, which suggested a success of about 54 per cent Such suppositories are still widely used by the public, they cost comparatively little, are effective whether the vagina

is dry or lubricated, and keep well in temperate climates though not as well in the tropics Their disadvantages are, first, that for some couples the cocoa butter has a slightly unpleasant odour and greasiness, secondly, that the quinine may produce, *in one or other of the partners*, a local irritant or general toxic reaction, and thirdly, that because of the effect of the greasy base upon rubber they cannot be used in conjunction with occlusive caps or washable sheaths Nevertheless, they can be used with the condom, and except for their æsthetic disadvantages are very effec tive in this combination It cannot be claimed, however, that apart from being less sticky they have any merits that are lacking in Volpar Gels

Finally, *it must be mentioned that in a very small pro* portion of women the Volpar products provoke an allergic reaction, local or general This appears to be of no great consequence and the remedy is to replace Volpar by one of the other approved products The suggestion that the regular and frequent use of Volpar might, through the cumulative effect of the mercurial active principle, produce toxic symptoms, has proved entirely without foundation It was disposed of by a thorough and painstaking investiga tion published by Eastman and Scott in *Human Fertility* in 1944

Contraceptive Jellies and Pastes

These terms are applied to semi fluid preparations put up in collapsible tubes and designed for use alone or in conjunction with such devices as occlusive caps *Prepara tions in this class keep well and can be used in any climate*

When the jelly or paste is used in conjunction with a cap, the patient is usually instructed to smear a little of the preparation all over the rubber, and to apply a dose of about one teaspoonful or more on to the upper (cervical) surface In most Family Planning Association clinics *it is* customary to recommend Volpar Paste as the first choice for use with caps, but experts vary somewhat in their choice of products The fact that Volpar Paste, though highly spermicidal, has not very good lubricating properties is one reason for the occasional substitution or combination of other preparations *It should be added that Volpar Paste* is so designed that the spermicide diffuses readily, yet in spite of this the product also has good lasting power

Some of these products are designed by the manufac turers to be used as the sole contraceptive measure They

are then injected into the vagina by means of an applicator, and it is probably rightly claimed that on the whole they give a higher degree of security than does the ordinary suppository thus used When used alone they are introduced deeply into the vagina with a view to protecting the cervix against invasion by sperms Unfortunately this procedure is not always as easy as it sounds In some instances the nozzle through which the jelly or paste is expressed is too pointed for safe insertion, and the woman should cover the tip with her index finger and introduce it thus shielded into the vagina This is not difficult in the recumbent position Once the nozzle is in place she can withdraw her finger and express the jelly from the tube with one or both hands The average amount for a single application is about 5 c c

With some preparations a single glass or metal nozzle is provided which must obviously be cleansed after each injection, with others there are separate nozzles meant to be thrown away after use, for each separate application

The advantages of jellies and paste are that they can be used in any climate and do not depend for their effectiveness on the condition of the vaginal secretion Their drawbacks are that they are costly and rather cumbersome and ostentatious in use For these reasons, they are not widely employed in Britain and are mainly reserved for such cases as the following

(1) For use by couples who either cannot or will not use a mechanical device In such cases jellies may be preferred to suppositories in the hope that they may offer greater security

(2) For rapid introduction if it is found that a sheath has slipped off or become torn

Foam producing Preparations

These preparations are available in tablet form Like other chemical contraceptives they exert both a spermicidal and a barrier action

Unfortunately the tablets do not always disintegrate to produce the gaseous foam, and in some cases their disintegration is very slow and incomplete This is because their effectiveness depends in large measure on the presence of sufficient vaginal moisture to ensure their solution Many women, however, particularly frigid women, produce very little vaginal secretion, other women, who usually secrete adequately, may fail to do so on occasion In these circum-

stances the tablets, as well as being ineffective, sometimes remaining undissolved many hours after their introduction, may also produce a stinging pain of the vagina and possibly of the penis These defects can to some extent be overcome by dipping the tablets for a moment in water before introducing them into the vagina, but to many this is tiresome and it may even be unavailing, the effervescence thus initiated often stopping when the tablet has undergone only partial or insufficient solution

On the other hand, the tablets have qualities which continue to commend their use in some cases They are inodorous and neither sticky nor greasy, and unlike other suppositories they keep excellently in the tropics Many women with adequate or excessive vaginal secretion definitely prefer them to the suppositories with a glycerine gelatin base which are normally used in conjunction with rubber occlusive caps or sheaths

CHAPTER FIFTEEN

THE SAFE PERIOD

BEFORE entering upon a discussion of the safe period, it will be as well first to dispose of an awkward problem of terminology Quite simply, the problem is whether or not the restriction of coitus to the infertile phase of the cycle, assuming for the moment that such a phase exists, should be regarded as merely one among the many methods of contraception, differing only in technical detail and not in principle from the other expedients discussed in this section Admittedly there are no differences in objective Safe period intercourse, like ordinary contraception, is practised by those who wish to satisfy their coitive impulses while as far as possible avoiding the chances of conception But whereas birth control by chemical and mechanical devices is condemned as "unnatural" by the Roman Catholic Church, safe period intercourse has its approval, as a "natural' method of spacing births or limiting family numbers

It is thus seemly to adopt a terminology which respects this distinction restricting the term 'contraception' to mechanical or chemical methods of birth control, or to those which, like coitus interruptus, involve extra vaginal ejaculation, while regarding safe period intercourse as a natural practice which satisfies all the requirements of normal, uninterrupted and unprotected coitus

Possibly it may seem that we have here a distinction with no real difference, but no one could hold this view who has studied the writings of Catholic authors on the subject For them the distinction is absolute Contraception is sinful and no more to be condoned than any other unnatural vice, safe period intercourse on the other hand, though like contraception it is directed to family limitation or spacing, is not merely sanctioned but, because during the fertile phase of the cycle it may call for considerable restraint, is even regarded as a positive virtue

Alternation with Contraceptive Methods

In the following pages, therefore, safe period intercourse will be discussed not as a method of contraception but as

an alternative to such methods, whether the alternative is adopted to the complete exclusion of contraception, or only during the infertile phase of the cycle as it may be by some couples when they have reason to believe that their usual contraceptive precautions can be safely dispensed with

This alternation of contraception with safe period intercourse calls for special consideration It has been held against the safe period that it involves a regulation of marital life, not by the normal periodicity of sexual desire but arbitrarily by the calendar, impelling couples to an unimpassioned coital routine during the sterile phase of the cycle, but imposing restraints and frustrations upon them when their sexual impulses are at their peak and most urgently in need of satisfaction This is a serious objection and its force should not be underrated, but clearly it does not apply when contraceptives are ordinarily employed and only relinquished when it seems almost certain that the chances of fertilization are negligible, if not completely absent The fact must be faced that to some sensitive couples, admittedly a minority, the use of contraceptives is always irksome, always inhibitory to desire and capacity, and for these at least there can be an inestimable gain in happiness and marital harmony from the knowledge that through certain days in every cycle coitus may be enjoyed unprotected by contraceptive devices

It must be realized, however, that such a switch over from contraception to a safe period intercourse is not within the capacity of all couples If the intelligence of the wife is not of a high order, high enough at least to enable her to estimate the phases of her cycle, or if her periods are grossly irregular, the use of safe-period intercourse is too hazardous, and she and her husband should be urged to depend on contraceptives throughout the whole length of the cycle Further conditions which may prohibit the use of the safe period, temporarily or for good, are discussed later in this chapter

Physiological Basis of the Safe Period

Perhaps the chief limiting factor on the widespread use of safe-period intercourse is that it calls for intelligent co operation on the part of the patients, based on a fair understanding of the established facts about the events in the menstrual cycle The practitioner will find it con venient to expound these facts in some such sequence as the following First, the patients must be assured that in

the human female ovulation occurs once in each cycle, and once only There may indeed be anovulatory cycles (see page 79), but these excepted the generalization holds true, and suggestions to the contrary—for instance, Samuels's view that ovulation occurs twice in each cycle—are entirely against the weight of scientific evidence Secondly, ovulation bears a definite time relation to the onset of menstrual bleeding, and is not stimulated, as it is in some animals, by the act of coitus According to some authorities this generalization applies only where there is a settled marital relationship and not where couples are reunited after long separation But although violent coitus could conceivably precipitate ovulation in a Graafian follicle about to burst, it seems unlikely that it could do so at other times Nevertheless, the practitioner would do well to mention the point as a possible cause of failure in some cases Thirdly, he should explain that in every cycle ovulation *precedes* the onset of menstruation by fourteen days

The exposition of this third point cannot be too precise Many patients have picked up the notion that ovulation *always* occurs at the mid cycle, half way between the onset of one menstrual period and the next This view is erroneous and misleading, and can most effectively be dispelled by a visual demonstration, in the form of simple line drawings, of the events in cycles of different duration

A convenient method is to show in three lines of different lengths—representing short, average and protracted cycles —that ovulation always bears the same time relationship to the onset of the following menstruation Thus, in Fig 12, the top line (A) represents an 18 day cycle, the middle line (B) a 28 day cycle, and the bottom line (C) a 35 day cycle, but in all cases there is a 14 day interval between ovulation and the onset of the next period Ovulation does indeed occur midway in the 28 day cycle, but in the others there are considerable differences between the pre- and post ovulatory phases (sometimes called the follicular and luteal phases), the post ovulatory phase being constant and the variations in length *always* occurring in the pre-ovulatory phase

The patient is now ready to understand, what without these preliminaries would be so perplexing, why ovulation time must be reckoned not by counting forwards from a known date—namely the onset of the last period—but by counting backwards from a date that can be assessed only approximately—namely the onset of the next period

Clearly, if all cycles were of precisely the same length there would be no further problem But in fact cycles vary in duration, if only by a day or two, even in women who are regarded as "quite regular" A range of variation of four or five days is indeed by no means uncommon, women who describe themselves as having a 28-day cycle some times menstruating at intervals (from the onset of one period to the onset of the next) as short as, say, 24 days and as long as 32

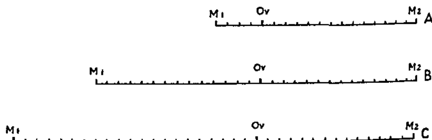


Fig 12

OVULATION IN AVERAGE LONG AND SHORT CYCLES

The three horizontal lines represent complete menstrual cycles The intervals shown by the intersecting lines represent days In each cycle M1 stands for the first day of menstruation Ov for the date of ovulation and M2 for the first day of the following menstruation It will be seen that in all three cycles the post-ovulatory phase is the same length—i e fourteen days The variations always occur in the first or pre-ovulatory phase

Assessment of the Safe Period

For any patient contemplating the use of safe period intercourse, the implications of these facts cannot possibly be overstressed Before trusting herself to this complex method *she should keep a menstrual diary for* at least six months, and preferably longer In such a diary she should record the onset and duration of every menstrual period, so that eventually she may obtain a very fair idea of the duration of her shortest and longest cycles

The practical application of this knowledge may be made clear by a simple example Let it be supposed that, at the end of six or more months, the patient finds that the duration of her shortest cycle is 25 days and of her longest cycle 30 days She may then reasonably assume, if her menstruation begins on July 1st, that the one following may be expected not earlier than July 25th (if the cycle is among the shortest) or later than July 30th (if it is among the longest) Counting back 14 days from July 25th would

bring her to July 11th, and from July 30th to July 16th It follows therefore that ovulation will occur on any day from July 11th to July 16th inclusive, and this period must accordingly be regarded as part of the potentially fertile phase of her cycle

But only a part For the ovum may remain fertilizable for a day after ovulation, which would extend the potentially fertile phase forward to July 17th, and sperms emitted in the genital tract three days earlier may still retain their capacity for fertilizing the ovum, which would bring the potentially fertile phase back to July 8th Thus, in this particular instance the narrowest limits that may safely be prescribed for the *fertile* phase are from July 8th to July 17th, although for extra security it is well to add a couple of days at each end, bringing the limits to July 6th and July 19th

If in this hypothetical case safe period intercourse is the sole precautionary measure, then the couple must be completely continent during the whole of the period from July 6th to July 19th inclusive, but may enjoy unprotected coitus from the cessation of the menstrual flow until July 6th, and then again from July 20th until the onset of the next period For couples who use contraception there need of course be no such period of enforced continence In their case coitus should be protected in the ordinary way during the fertile phase, but may be enjoyed without the usual contraceptive precautions throughout the rest of the cycle

Temperature Records and Ovulation Symptoms

An alternative method for estimating the fertile phase is by means of the cyclical temperature records described on page 82, or by taking special note of the manifestations of ovulation—namely *Mittelschmerz* and ovulatory bleeding or "spotting"—discussed on page 85 Any woman whose cyclical temperature record is of the type that offers unambiguous evidence of the separation of the ovum, or who has equally unambiguous *Mittelschmerz* and/or ovulatory bleeding, may safely assume that her cycle will enter upon an infertile phase three days later The three-day time lag ensures the necessary margin of safety The safe period estimated on this basis is necessarily more restricted than that estimated on the basis of a carefully kept menstrual diary Its total duration indeed, unless the couple are prepared to take risks which may prove unwarrantable, extends only until the onset of the following period But if

the periods are irregular, and particularly if the cycles are very short, this restricted safe period is the more dependable, being based on a direct experience of ovulation and not merely on an estimate of a range of dates within which it will probably occur

The Practitioner's Responsibility

The duty of the practitioner is at any rate clear If the woman is unintelligent or over-confident he must warn her against attempting the method at all The over confident type is easily recognizable It includes women who would rather trust to their memory than go to the trouble of keeping a menstrual diary, or who state firmly that they are *quite* regular and have a cycle of such or such a length, or who prefer to estimate the range of days within which their ovulation may occur by mental arithmetic rather than by the slightly less fallible method of counting backwards on the calendar

If the woman seems intelligent enough to keep a menstrual diary, but not so intelligent as to be entrusted with the calculations, the practitioner should advise her to send the diary to him and let him make the calculations on her behalf This system has lately been adopted, apparently with success, at the Margaret Sanger Bureau in New York Here the patients are instructed to hand their menstrual diaries to the clinic doctor and then to let him know at once, by letter, the date of onset of their menstrual flow With this information before him the doctor is able to tell the patients, by return of post, when the fertile and infertile phases of their cycle will begin and end, thus taking over a responsibility which in private practice can usually be left to the patients themselves

In dealing with intelligent and trustworthy women who, by the duration and regularity of their cycles, are constitutionally adapted to the method, the practitioner is entitled to say that safe period intercourse offers as great an expectation of success as do the contraceptive methods recommended and taught in birth control clinics Like these methods it must be correctly applied, and like them it admittedly has what has been styled an "inevitable failure rate' (see page 169), but with these reservations it may be recommended as a substitue for contraception (e g to Roman Catholics) or as an alternative to it during the infertile days of the cycle

For women who are prepared to use the more restricted

safe period, the first duty of the practitioner is to ensure that they understand, and are prepared to follow, the precise technique of making cyclical temperature records, and he must then scrutinize these records with a view to deciding whether they belong to the type that offers unequivocal evidence of ovulation Similarly, in advising women with *Mittelschmerz* or "spotting", the practitioner must first decide whether these symptoms are unequivocally present, and not as in some cases autosuggested, and then, if the matter is beyond reasonable doubt, he must still warn the women that the safe period must not be assumed to begin until three days after the cessation of their symptoms This safety margin is vital, for there are reasons to believe that the pain and bleeding may occur shortly before the separation of the ovum and not synchronously with this event

Contra indications of Safe-period Intercourse

Finally, patients must understand that there are circumstances in which they must on no account put their trust in the safe period as a method of avoiding conception Some contra indications have been mentioned already for instance, great menstrual irregularity and the habitual occurrence of very short cycles These contra indications are not necessarily absolute, however, for although they introduce an additional element of risk and uncertainty they do not wholly rule out the practice of the method under skilled medical supervision

But in some cases safe period intercourse is wholly inapplicable For instance, the technique cannot be imparted to mentally subnormal patients, nor should it be entrusted to those too feckless to follow consistently the directions essential to success The experienced practitioner can recognize almost at a glance the patients who may and those who must not be taught the method It is well, too, to regard the menstrual irregularity that occurs at about the time of the menopause as an absolute contra indication, rather than to let the patient risk an unwanted conception near the end of her reproductive life

Difficulties sometimes arise from the occurrence of amenorrhoea, for instance after childbirth or miscarriage, for in this event the basis of the necessary calculations is lacking And even when the periods start again, it must not be assumed that the cycles will be of the same length as before The whole business of keeping a menstrual diary

over a period of months must start afresh, the method not being resumed until the cycle has become fully re estab lished and its range accurately calculable

Finally, it should be borne in mind that the character of the cycle sometimes changes after illness and in periods of mental stress, sometimes after a change of climate or altitude, and occasionally without any obvious reason The successful use of the safe period thus calls for a careful record of menstruation throughout the whole of repro ductive life If the cycles become longer or shorter, or if the difference between the longest and shortest cycles becomes greater or less than before, extra precautions must be taken until the new rhythm has become well enough established to be used as the basis of fresh calculations

Summary and Conclusion

Safe period intercourse is a permissible alternative to contraception for Roman Catholics, and by some other couples it may be used instead of their ordinary contraceptive devices during the infertile phase of the menstrual cycle The sequence of phases in the cycle can be estimated by a diversity of methods of which three in particular can be recommended to patients, as calling for intelligence and care rather than recourse to special apparatus The first is by keeping a menstrual diary for at least six months, but preferably longer, using the record in every cycle as a basis for calculating the range of days within which the next ovulation may be expected The second is by keeping a cyclical temperature record, looking out for the character istic notch in the curve that betokens the transition from the pre-ovulatory to the ovulatory phase (see page 83) And the third is by taking note of certain symptoms—particularly abdominal pain (*Mittelschmerz*) and slight vaginal bleeding—which in some women mark the immi nence of ovulation Whichever the method employed a margin of safety must be added to allow for the viability of the ovum for some hours after the rupture of the follicle (say twenty-four hours) and for the viability of sperms in the favourable environment of the cervical plug (say three days) This means that coitus three days before ovulation and one day after it must be regarded as potentially fertile and for added security yet a further day or two should be added at both ends During the fertile phase of the cycle thus estimated, ordinary couples who wish to avoid con ception *must* use one or other of the combinations of contra-

ceptive devices recommended in this section Roman Catholic couples who wish to avoid conception must, in this phase, exercise complete restraint

The efficacy of the method is subject to considerable variation, depending on such factors as the intelligence of the couple, the regularity and duration of the cycles, and the intervention of such factors, physical or emotional, as are known to disturb established menstrual rhythms It is completely contra indicated during periods of amenorrhœa, such as follow pregnancy or abortion, and must continue so until, on the evidence of a carefully kept menstrual diary, the rhythm has become completely re established and predictable

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meet the different mechanical conditions that may be found in the vagina, the principles underlying their application are the same in all cases Correctly used, each type forms a mechanical barrier imperceptible to both partners but preventing the direct emission of semen against the cervix They are not intended to fit tightly across the vagina, but rather by their presence to increase the distance that must be traversed by the sperms on their way to the cervical os When the Dutch cap is used the rubber, at least on the cervical side, is covered thickly with a spermicidal paste, when the cap is of the Dumas or cervical type, the paste is introduced also into the dome to about one-half of its depth, in order effectively to protect the entrance to the cervix For even greater security a spermidical suppository may be inserted below the cap, either just before or just after coitus If the cap is left in place for eight hours after coitus it may be safely removed without the trouble of douching, for by then there will be no active sperms left in the vagina

The average retail price for these appliances varies for Dutch caps it is from 5s to 8s 6d , for Dumas caps, from 5s to 7s 6d , and for cervical caps, 3s 6d The cervical and Dumas and ordinary-weight Dutch caps may last *anything from nine months to three or four years, provided* that the climate is temperate and that neither grease nor vaseline is applied to the rubber In tropical climates, caps may have to be renewed every three to six months, and should be stored in powder in air tight tins

Care of Caps ——After use the cap should be washed with soap and water, dried and put away in a box, ready for use when required It is a common practice to cover the cap with French chalk or powder, with the object of preserving the rubber If this is done, it must either be washed again before use, or shaken free of the powder, for otherwise an undesirable paste will be formed when the cap is used again Since these caps normally last as long as two or three years and cost only a few shillings, the additional trouble hardly seems worth taking Latex and some other rubber caps do, however, last better if powdered Caps which are used for fitting purposes should of course be washed and sterilized by boiling

Method of Fitting

There are certain points common to the fitting of all caps which can conveniently be considered together

CHAPTER SIXTEEN

THE PRINCIPLES OF THE OCCLUSIVE CAP

UNTIL a new and easier method of contraception has been discovered, some form of occlusive cap will remain the method of choice for most couples It must be remembered that the sheath, the only other harmless device which offers a comparable degree of security, is unacceptable to so many people that the use of a cap must often be the alternative method And in fact, supplemented by a chemical contraceptive, it is more commonly prescribed at birth control clinics than any other contraceptive measure or combination of measures

The technique of fitting occlusive caps is not difficult, but very definitely it calls for practical apprenticeship, and the physician who wishes to acquire the requisite skill is strongly urged to put in a few sessions at a teaching clinic Although a theoretical knowledge alone may suffice for some cases, there are many which demand real experience in the choice and the fitting of the cap Details of post graduate sessions with practical demonstrations can be obtained from the Family Planning Association, 69 Eccleston Square, London, S W 1

The practitioner should reckon that to fit and teach a patient the full technique will take two consultations, the first averaging a half to three quarters of an hour, the second about a quarter of an hour In addition to the cost of this service, the patient will have to spend some 9s 6d on the appliance and the first supply of chemical contra ceptives Poor patients, for whom such costs are prohibitive, should be referred to the local municipal clinic, if they are eligible on grounds of ill-health, or to the nearest clinic under the auspices of the Family Planning Association (see Appendix 2)

Types of Caps and Principles of Application

Three types of caps are most commonly used in Britain the Dutch, Dumas and cervical (Figs 13, 19 and 22) But although these differ in detail, for they are designed to

reason the fitting chosen at the first consultation should be regarded as provisional The question whether the size is correct should be decided when the patient returns with the cap already *in place*, at the next appointment It is thus obvious that the practitioner will need a fair supply of old caps for fitting purposes These can be sterilized by boiling, and the one that seems most suitable can be lent to the patient for subsequent practice After her second attendance, when the correct size has been chosen, the patient should of course get a new cap for regular use

Instruction of Patient

Once the choice of cap has been made, the patient should be instructed to feel it *in situ*, and to withdraw it from the vagina For a woman who is at all diffident this may be the most difficult moment in the whole procedure A simple order such as "Now slide your finger well up the passage and see if you can find the cap ', given in a voice which shows that she is expected to do so promptly with no further discussion, will be of great help to her, and usually, once she has managed this, no further difficulties will be encountered

When she has found the cap and learnt how to extract it, she should be taught to feel for her own cervix This is usually easiest if she adopts a squatting or half kneeling position, maintaining it for the subsequent replacement of the cap When the patient is in this position the index and second finger reach well into the vagina, and if she bears down slightly, can usually locate the cervix quite easily She should then be shown once or twice how to insert the cap, how to make sure it is fitted correctly and how it feels if the position is incorrect Some patients find it easier to fit a cap while lying on a bed in the dorsal position Finally, the vulva should be dried with a swab of cotton wool and the patient allowed to wash her hands and to dress

The ease and celerity with which these instructions can be carried out vary with the patient, but also with the experience and tact of the physician Some women are strongly disinclined to examine the shape of the vagina and cervix and can only do so without distress on the firm assurance of the physician that this act is permissible and necessary Skill in handling difficult cases comes with practice, but it is well to remember that it is precisely the management of these cases that gives interest to what can easily become a monotonous routine

Later, the details of the choice and fitting of individual caps will be explained The practitioner will find it useful to possess a full range of caps of every type and size The initial cost of this equipment is roughly £6, and though the original stock will perish in two or three years the caps can be boiled and used repeatedly for fitting purposes

The procedure in all cases is to take a full relevant history A thorough pelvic examination is then made, including examination of the cervix, using a speculum and a good light For the actual fitting, the patient should lie on the back, with the knees slightly flexed The coverlet should reach well down to the knees so as to minimize any feeling of exposure Some experts prefer the Sims position

It is not always possible to judge merely from the bimanual examination which type of cap will be suitable The Dutch cap has undoubtedly the widest application, and it is a good practice to try this type first and only to go on to the others if it is found unsuitable Since there are experts who prefer the Dumas cap and some who prefer the cervical cap, absolute superiority cannot be claimed for any type [1] In fact there are patients for whom one or other type is the only possible choice And for this reason alone the practitioner will find it necessary to include all types and sizes in his equipment

Before fitting the cap it should be well covered with a non-greasy lubricant (such as KY jelly) or dipped in a bowl of soapy water If a Dutch cap is used, it is often advisable to insert it without allowing the patient to see the size beforehand As she is generally unaware that the cap is in place, this will go far to reassure her that, although it appears large, it will not cause discomfort During the process of choosing a suitable size, the patient may be told that neither she nor her husband should be able to feel the cap If she seems unconvinced, it should be explained to her that the genital organs lack the capacity for fine discriminative sensation, and she may be assured that the great majority of men and women are unaware of the presence of an occlusive cap during coitus

As the teaching proceeds it will usually be found that the patient relaxes the vaginal musculature, necessitating (in the case of the Dutch and Dumas caps) the use of increasingly larger sizes Complete absence of vaginismus during a full pelvic examination is exceedingly rare, and for this

[1] At one large teaching clinic investigation showed that of 300 consecutive patients 6 were fitted with cervical caps and 43 with Dumas caps all the rest were fitted with Dutch caps

and tone of the vagina Temporary descent of the cervix may sometimes confuse the patient and make it impossible to slide the Dutch cap into the posterior fornix Fullness of the bladder or rectum may be equally a cause of confusion to the inexperienced patient To the physician it is often disturbing to find how much a sagging anterior vaginal wall can, during movement in the erect posture, lower the front portion of a Dutch or Dumas cap which, in the recumbent position, has appeared to fit quite well To test the adequacy of a cap in such cases it is necessary to see whether two *straight* fingers can, in any position, displace it enough to reach the cervix It is common to find at the second session that a larger fitting is required, and it would thus have been wasteful for the patient to buy for permanent use a cap of the size fitted on the first occasion The patient should also be asked whether the cap is dislodged by defæcation, as sometimes happens with the Dumas cap This does not necessarily imply an unsuitable choice, for the cap is not designed to take pressure from the cervical surface, but it is a point, often with several others, which should be dealt with before the patient is finally dismissed

At the end of the first lesson the patient usually expresses herself as relieved that the procedure has been so simple, but if she still lacks confidence it is well to assure her that the technique is only a matter of knack which it is worth learning at once so as to have at her disposal a method which can be used when necessary throughout her reproductive life In practice very few women are found unsuitable for wearing a cap, and fewer still are unable to learn the technique of using it

The method is often adopted in spite of initial severe prejudice, for with regular use this nearly always becomes mitigated and, on the patient's own admission, the trouble of the method becomes negligible With practice, the insertion and removal of the cap become so rapid as to involve but a slight addition to the daily toilet

General Directions to Patient

The woman may be instructed to insert the cap either just before she requires it or, if she prefers, a few hours previously This alternative is of the greatest value to a woman who is diffident about any interruption at the time of coitus or any ostentatious preparation when her husband is present Such women may choose to insert the

Conditions which preclude Use of Cap

Very rarely the conformation of the vagina and cervix may preclude the use of any sort of cap whatever The commonest causes of this difficulty are

(1) Acute anteversion of the uterine body with a cervix pointing backwards and a flat anterior vaginal wall

(2) Extreme laxity of the introitus associated with cysto cele and/or rectocele, particularly if the vagina is short and the cervix badly split

The use of the cap may also be precluded in cases in which the patient is very stout and has fingers too short to reach the cervix

Occasionally a cap cannot be fitted on account of ex treme vaginismus, and the best advice, if sexual life has not yet been established, is that the husband should use a condom, in the hope that later on, if the vaginismus should resolve, the fitting of a cap will not present any difficulty In all cases of primary vaginismus the use of a cap should be discouraged Women with this condition are invariably hostile to methods involving the insertion of any appliance, and if the cap chosen is of the Dutch type will often feel discomfort from the pressure of the vaginal walls against it It is true that a cervical cap may be more suitable, but when the vaginal introitus is in spasm the woman seldom finds it easy to reach her cervix

The First and Second Consultations

At the first consultation it is generally sufficient for the patient to learn how to insert the cap, leaving details of its use, with other adjuvant methods, to be discussed at the return visit The patient should be told to practise putting in the cap several times, to wear it one night and to return wearing it, but on no account to trust to it until after her second consultation She should be told that there is no need for her to be nervous about it when she is alone, for if she finds the cap difficult to extract she can leave it for a few hours and try again Some patients also need assurance that the cap cannot possibly be lost, either by falling out or by getting up into the abdomen

When, as sometimes happens, the patient learns rapidly, it may be tempting to let her forgo the second lesson which many patients feel sure they do not need But the greater the experience of the practitioner, the less likely is he to consent to such a course In the first place, difficulties are always liable to arise on account of the variable shape

cervical surface It is customary to advise a dose of at least one teaspoonful of paste on the cervical surface so that the entrance to the os is safely embedded in the spermicidal substance In cases in which the fit of the cap is not entirely satisfactory or in which circumstances necessitate extreme precautions, it is usual also for a contraceptive suppository to be placed below the cap in order that the bulk of the semen may be destroyed in the lower part of the vagina A suppository with a glycerine gelatin base is usually chosen, but in some cases a dry foaming tablet may be recommended (see page 151) The most usual procedure is to insert the suppository a few minutes before coitus, but women for whom this involves an objectionable interruption may prefer to leave this particular precaution until immediately after coitus It is probable that the two methods differ very little in reliability

Whether a suppository is used or not, the procedure recommended is to delay the removal of the cap until at least eight hours after intercourse If intercourse is repeated, some hours later, an additional suppository may be used, or more paste may be introduced by an applicator, the eight hour period should take effect from the last coitus Should this occur in the morning before rising, the patient will have to wear the cap for the first eight hours of the day For some women this is quite inoffensive but others experience considerable leakage and should either wear a diaper or insert a small wick of cotton wool in the vaginal orifice

Should it prove necessary or desirable to remove the cap earlier than eight hours after coitus, either on account of discomfort or because of the chance of its being dislodged by defæcation, or simply because the patient dislikes keeping it in, the vagina should first be douched thoroughly to ensure the destruction of all the sperms

It is difficult to make a statistical assessment of the relative reliability of the variants that have been discussed The type of patients, their intelligence, and their ability to pay for their appliances vary from practice to practice and from clinic to clinic It has been reckoned that an occlusive cap used with an efficient spermicide either in the form of a paste or suppository or both, and retained for eight hours after coitus, will give an expectation of success in the order of 96–98 per cent These 2–4 per cent of failures must be regarded as the "inevitable failure rate" that may be expected in a group of women who have used

cap regularly at bedtime, whether they expect to use it or not, so as to avoid being unprepared on any occasion

In general, the use of the cap is easy and comfortable, and no more harmful to the vagina than the use of a dental plate is to the mouth Simple rules for its removal and cleansing are naturally important The cap should not be worn longer than about twenty hours without being re moved and cleaned, and preferably not so long if there is any pathological discharge

Traumatic and other Complications

It is remarkable how seldom occlusive caps produce traumatic effects Occasionally they cause bleeding from an erosion or appear to exacerbate a trichomonal infection, and sometimes the chemical contraceptive used as an adjuvant may produce an allergic reaction in the form of a transient vaginitis Quinine-sensitive persons may suffer discomfort from the use of pessaries containing this sub stance, and this applies as much to the husband as to the wife

A very occasional complication, observed in patients who have recently learned the use of the cap, is an attack of urethritis Slight pain and frequency are complained of for a few days, although the urine remains free of albumin Alkalis should be prescribed and the use of the cap with held until the symptoms have completely subsided It is difficult to know whether this syndrome should be classed as a traumatic or as an infective urethritis It appears to be akin to the well known "honeymoon cystitis' which is not necessarily associated with the use of contraceptives

No ill results appear to occur if the cap is worn for a few hours during a menstrual period, though it is clearly undesirable that it should be retained for long in these circumstances *Patients can usually have a cap refitted* during the fifth or sixth week of the puerperium

Supplementary Techniques

Expert opinions vary as to the supplementary techniques that should be used with the cap, but it is agreed that these may be adapted very widely to individual preferences Some supplementary precautions are regarded as essential, however Thus, it is recognized that no cap can fit so accurately that sperms may not make their way round the rim, and accordingly a spermicidal paste or jelly should cover the cap and be spread thickly over the

8 Caps should be washed with soap and water, and dried They may be powdered with French chalk No ordinary ointment should be applied, as rubber perishes if touched by grease or vaseline

Most caps require renewal about once every two or three years, rubber perishes with age, and more rapidly in tropical climates

Caps should be inspected from time to time to see that no faults are developing When the rubber loses its elasticity it is time for a new cap

It is advisable that the fit of a cap should be checked occasionally This is particularly necessary in the case of newly married women, and essential after each childbirth

For these return visits it is *always* desirable that the woman should attend with the old cap *already* in position, preferably having worn it for a few hours It is not possible for the doctor to give an accurate judgement about a cap unless it has been worn for a little while *Please try to remember this fact!*

It is advisable that you should return in ____ months

It must be repeated that although these directions appear imposing on paper, the whole technique takes but a few moments to apply, and, once acquired, soon becomes automatic and unobtrusive to most women

the method correctly, over a period of at least ten years Where the method has been only partially or carelessly used the expectation of failure is of course much greater

As a further safeguard against carelessness or error the main points of the technique can be conveniently stressed in written instructions, which in private practice may take account of variations in procedure, but in clinic practice are usually standardized in some such form as the following

Preliminary Instructions

Practise placing the cap and removing it, until you can do it quite easily Cover the cap with the paste you have been given before insertion After use, wash the cap with soap and water and dry carefully Some women who lack sufficient moisture find that intercourse is more comfortable if they are moistened with a lubricating jelly The paste you have been given is very effective, but it may not be sufficiently lubricating for you Ask the doctor if you would like an additional lubricant

Sleep with it in place, and notice if the cap causes any discomfort or becomes dislodged when the bowel is moved in the morning Do not trust to it with your husband until you have paid your second visit to the doctor

Return here with it *already in position* This is most important

Instructions for using cap, size

1 Lubricate the vaginal entrance if necessary

2 Smear a little paste all over the cap, and apply the dose of paste (at least one teaspoonful) to the upper surface Insert at any convenient time before use

3 If extreme precautions are needed a suppository may be inserted below the cap, either just before or just after intercourse

4 The cap must not be removed until at least eight hours after intercourse, otherwise some of the sperms may still be active and able to reach the womb If intercourse is repeated, the eight *hours must count from the last occasion*

5 Very occasionally a cap will cause discomfort when the bowel is moved, or if it is worn during the daytime In such cases, the sperms may be destroyed by a thorough douche, and the cap removed at any time The most efficient material for douching is vinegar (a tablespoonful to a pint of warm water), failing this, a lather of warm soapy water is most effective

6 *A cap should never be worn longer than about twenty* hours without removal for cleansing If intercourse is repeated frequently, it is convenient to douche and remove the cap without waiting for the eight hours interval

7 Should a period start whilst the cap is being worn, blood will collect into the cap, and eventually overflow No harm will result, and the cap may safely be removed at any time

most of the anterior vaginal wall are covered by the diaphragm of soft rubber Usually the cap is inserted with the dome uppermost towards the cervix, the freer edge of the rim being the more convenient for extraction

The size of the cap depends on the length of the vagina and is generally greater in taller women The most usual fittings for multiparous women tend to be from 75 to 85 mm, whereas 65 to 75 mm would be more usual among nulliparous patients In cases of retroversion the distance from the pubic bone to the posterior fornix becomes shorter, and even a multiparous woman may then wear a cap between 65 and 75 mm in size

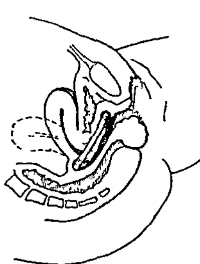


FIG 14. Dutch cap correctly chosen and placed Note how the front rim fits behind the pubic symphysis

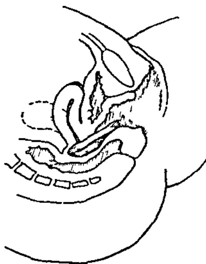


FIG 15 Dutch cap unsuitably chosen. No Dutch cap would suit this vagina, for the ill fitting front rim might permit access to the upper (cervical) side of the cap Probably a Dumas cap could be used

It is customary to fit the *largest size which is comfortable to the patient* With practice this measurement can be roughly estimated at once, and the more correct fitting is postponed until the second attendance when the patient will have less tendency to vaginismus

The suitability of a Dutch cap for any patient depends upon the shape of the vaginal cavity and the support which is afforded by the vaginal walls In many women the vagina offers a small niche above the pubic bone into which the front rim of the cap can rest

CHAPTER SEVENTEEN

DUTCH, DUMAS AND CERVICAL CAPS

THE DUTCH CAP

THIS cap is the best choice for most women It consists of a circular spring covered by rubber which forms the rim of the cap, across which is stretched a soft dome of rubber, the diaphragm (Fig 13) It is made in eighteen sizes, increasing in diameter by increments of 2½ mm, from 50 to 95 mm



FIG 13 Dutch cap size 7½

Different makes of cap vary in the stiffness and character of the metal springs Most clinics employ a cap with a fairly stiff watchspring One modification only is available at present, which is built on a spirally coiled spring, giving a more pliable contour This is often preferred on grounds of its appearance, and if the ordinary cap is uncomfortable It is prescribed occasionally for nulliparæ It is not necessarily interchangeable with the stiffer—and therefore more manageable—Dutch cap which is in more general use

The cap is fitted obliquely across the vagina, in the same way as a circular ring used for prolapse The back part of the rim lies in the posterior fornix, and the anterior part reaches to the back of the pubic bone and lies within an inch or two of the vaginal orifice Thus, the cervix and

The accurate fit of these caps depends on the tone of the vaginal musculature, a factor which varies slightly from time to time After a debilitating illness or after childbirth the cap should be refitted, and during the early months of marriage it may require refitting once or twice A patient fitted at the time of marriage should return for refitting in three or four months, but after that it is probable, though not certain, that the fitting will be suitable until after childbirth

The patient may feel disturbed at the front of the cap being so near the vaginal entrance, fearing on this account that it will be noticeable to her husband Actually this is not so, for the penis enters further back in the vagina and is liable to discomfort from the rim only when the cap is too small

It is not rare to find that a Dutch cap does not fit closely in front, but leaves a slight gap on either side of the pubic bone This is no contra indication to its use, for semen is not deposited against this part of the vagina

In patients with prolapse, who have to wear a supporting ring, it may be possible to fit a Dutch cap with a rim just slightly bigger than the ring itself With a little care, the cap can be removed and replaced without any disturbance of the ring It is said that the Dutch cap was originally made from a supporting ring, with a sheet of condom rubber stretched across it as a diaphragm

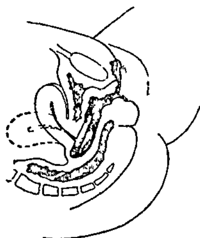


Fig 16 Dutch cap which is too small Again the front rim would probably cause discomfort to the husband and might allow access to the cervical surface

There is one other way of fitting a Dutch cap which should be mentioned, although it is but rarely employed A small size cap (generally 50–60 mm) can be fitted into the vault of the vagina, in much the same way as a Dumas cap, except that the Dutch cap, having a collapsible dome, cannot maintain its position in the same manner (Fig 16) There seem to be very few cases in which this fitting is suitable, and when it has been adopted caps have been known to drop out of

This niche is not likely to be present if the patient has a tendency to cystocele, and in some women the anterior vaginal wall slopes in such a way that there is no place suitable for the support of the cap (Fig 15) In general where the uterus is retroverted a Dutch cap can usually be worn, the front rim finding its place rather high up against the anterior vaginal wall

In cases in which the anterior vaginal wall offers little support for the rim of the cap (either on account of its shape or the presence of a cystocele), considerable experience is required to decide whether the Dutch cap is suitable or not The examining finger will find that the rim drops in front, and although this may not be uncomfortable for the woman, it is important to decide whether it can drop so much that the penis may possibly enter between the anterior vaginal wall in front and the cap behind In such a case the cap should be discarded in favour of another type, or a stiff rimmed Dutch cap may be tried with the dome downwards Used in the reversed position the rim has less tendency to sag downwards, and occasionally patients with a slight degree of prolapse find actual comfort from the support that such a cap can give In doubtful cases the woman can be told that if she inserts the cap when she is already in bed the front rim will stay up sufficiently, but if she has been walking about since its insertion she should remember to push the rim up when she lies down

It has been argued that a large Dutch cap with a stiff rim must inevitably tend to stretch the vaginal passage It must be remembered, however, that the vagina is not a hollow tube, but merely a potential cavity with the anterior and posterior walls lying in apposition The cap lies flatly along this potential space, and in this position does not stretch the vagina as it would if it lay across it at right angles A large cap with a stiff rim will occasionally cause discomfort to the vaginal walls, and very rarely some women are conscious of interference with muscular contraction during coitus Sometimes a Dutch cap causes discomfort when the woman is in the upright position The sensation, which is described as a vague aching or dragging pain, is caused by prolapsed or tender ovaries resting upon the cap, and is usually relieved at once by recumbency In such cases, if no alternative cap can be used, the patient should be instructed to douche and remove the cap directly she rises

while the right hand pushes the cap backwards along the posterior vaginal wall into the posterior fornix The last part of the cap to disappear must be pushed well up behind the pubic bone (Fig 17)

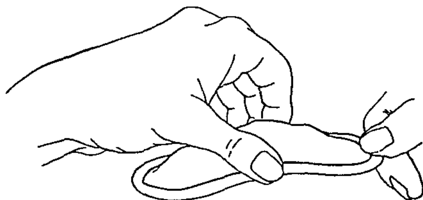


Fig 17 One of the ways a patient can hold a Dutch cap for its insertion

In a fairly large proportion of cases the cervix lies in such a position that the cap can be pushed into the anterior fornix instead of the posterior one (Fig 18) To avoid this, the patient should remember to direct the cap *backwards* towards the rectum, not upwards towards the abdomen It is most important that she should understand the difference between these two positions It is best that she should check the position of the cap by feeling for the cervix with her index or second finger, and thus make certain that it is covered by the soft rubber of the dome As it is not possible for all women to reach the cervix, the alternative guide is the position of the anterior rim of the cap If the cap is correctly placed, the rim should be well up behind the pubis and comfortable if pushed on by the index finger If incorrect, the anterior rim will be lower down, towards the entrance of the vagina, and usually causes discomfort when pressed on One of the risks of a small fitting Dutch cap is that these signs become less marked, whereas with a big one the wrong position is generally obvious, both to the wife and the husband

In cases in which the cap has been wrongly inserted its position can often be corrected by pulling the front rim half-out, and then pressing the extracted portion upwards towards the pubic bone This will point the posterior rim in a more backward direction, and if the cap is pushed in at this angle it may adjust itself correctly For such adjust-

the vagina during ordinary movement, such as walking When a cap used like this is in place, it tends to lie vertically down the axis of the vagina, so that the examining finger (and therefore the penis) can equally pass below it or above it, i e on to the cervical side The only advantages of the method are that there is no chance of the cap pressing on the vaginal walls and the fact that the woman prefers the look of a small cap to the big one Nevertheless, only one or two experts in this country employ it, and some clinic statistics of small fittings have yielded unsatisfactory figures

Some Advantages of the Dutch Cap

For most women it is the easiest cap to use, being the quickest to adjust and extract

Once placed correctly there is absolutely no risk of its becoming dislodged during coitus, provided always that the cap has been correctly chosen

It allows free drainage from the cervix and is therefore suitable if there is any tendency to erosion

The semen in the vagina is kept further away from the external os by this than by any other cap This gives a longer time for the chemical spermicides to act before the sperms could reach the external os

It can very often be used over a supporting pessary

Some Disadvantages of the Dutch Cap

In some women it may cause discomfort if worn in the daytime This is usually unnoticeable in the recumbent position

Occasionally it may cause some discomfort during defæcation, it may provoke urethritis by pressure, and it may cause discomfort in women with vaginismus or with prolapsed or tender ovaries

By covering the anterior vaginal wall it may inhibit coital sensation in the very small minority of women whose vaginal responsiveness is limited to this area

Where the vagina is short the husband may notice the posterior rim

Insertion of Dutch Cap

The patient should be instructed to hold the dome of the cap upwards in the hollow of her left hand The rim is squeezed together in the centre between the thumb and first finger and supported thus against the vaginal orifice,

while the right hand pushes the cap backwards along the posterior vaginal wall into the posterior fornix The last part of the cap to disappear must be pushed well up behind the pubic bone (Fig 17)

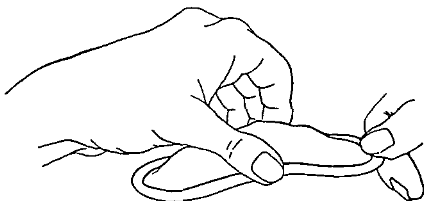


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ment of position a stiff-rimmed cap with a watchspring is better than one with a spiral rim, for this is too yielding

It is not unusual for a woman to find that there are certain days in the monthly cycle when the cap is more difficult to insert than others Usually these are shortly before the menstrual period It appears that the uterus lies lower than usual at these times, with a consequent tendency for the anterior fornix to be more accessible than the posterior fornix The direction of the cap into the wrong fornix is the only mistake likely to arise from the use of this method, and until the patient is entirely familiar with it she should always attempt to locate the cervix and make sure that it is covered by the rubber of the dome

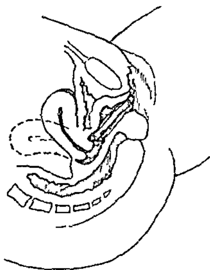


FIG 18 Dutch cap incorrectly placed The rim has been caught in the anterior fornix and would probably cause discomfort to both husband and wife This is the only mistake likely to occur with this cap or with a Dumas It can be prevented by careful location of the cervix

Extraction of Dutch Cap

The extraction of a Dutch cap is generally easy The index finger should hook down the anterior rim, pressing it against the back of the pubic bone An alternative method is to extract the anterior rim by gripping it between the tips of the index and second fingers

When the watchspring type of Dutch cap is used the rim may be found to be slightly out of the circular after its withdrawal It should be pressed back into a circle after it has been washed and dried

THE DUMAS CAP

This cap is intended to fit into the vault of the vagina, reaching from the anterior to the posterior fornix, and thereby covering over the cervix

Since the dome of the cap is stiff, the cap is supported from below by the bulging in of the vaginal walls, and in some instances it adheres to the vaginal vault by suction The Dumas is considerably smaller than the Dutch cap

It has no metal spring and is made of thick rubber at the edges, but of thinner rubber in the centre of the dome (Fig 19) Four sizes are used, small, medium, large, and extra large, and two types are available one in a pliable soft rubber, the other in a firm white rubber The latter is very suitable for staying up in a prolapsing vault (Fig 20)



Fig 19 Dumas cap size large

In general, this cap is unsuitable where the cervix is large or pointed, as the dome is not deep enough to contain any but an average cervix It should not be worn over a flat cervix or over one which is pointing backwards or is even at right angles to the axis of the vagina, for in these conditions the cap is liable to become dislodged by the penis (Fig 21)

In all cases, it is necessary for the woman to come wearing the cap before the fitting is passed as correct, for a spasm of the vaginal muscles may make this cap appear an excellent choice, whereas subsequent relaxation may leave it totally unsupported

Some Advantages of the Dumas Cap

It is particularly suitable for cases of prolapse with cystocele, rectocele, or both, especially if the vagina is short

Less of the vaginal surface is covered by this than by a Dutch cap

Discomfort is very seldom caused to the woman by this cap, even when worn in the upright position

Some Disadvantages of the Dumas Cap

It is sometimes difficult to insert correctly and to extract

It may occasionally become dislodged during coitus

It may be dislodged during defæcation, but if necessary most women learn to keep the cap in position by steadying it with the fingers

The stiffer type of Dumas is sometimes uncomfortable for the husband

Insertion of Dumas Cap

The patient is instructed to squeeze the sides of the cap together with the hollow facing upwards, and to push it thus into the vaginal orifice The anterior part of the cap is then pressed upwards until it moves into the anterior fornix, the back part automatically passing over the cervix into the posterior fornix *It is necessary that the patient should feel round the vault of the vagina, to make sure that the cervix is not uncovered*

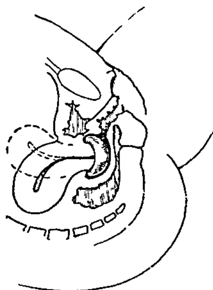


FIG 20 Dumas cap correctly chosen and placed

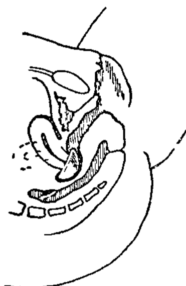


FIG 21 Dumas cap unsuitably chosen It would probably be dislodged by the husband

Extraction of Dumas Cap

Extraction of this cap is best effected in the half kneeling or squatting position, either by dislodging it from the fornix with the right index finger hooking down the left posterior quadrant of the cap, or by pressing the ball of the thumb backwards on the anterior rim Once the cap is dislodged, it can be pulled out quite easily by the finger Extraction will be facilitated if the vagina is shortened by the patient "bearing down", but if necessary a loop of fine tape may be threaded through the edge

THE CERVICAL OR "PRORACE" CAP

This cap is designed to fit on to the cervix itself, and is independent of support from the vaginal walls It has a firm, rolled rubber ring and a thimble shaped dome (Fig 22) Its fame has been made world-wide by Dr Marie Stopse, who has advocated its use for many years

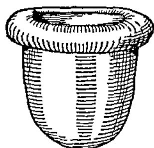


Fig 22 Cervical cap size 1 full dome

Seven sizes are supplied, 00, 0, 0½, 1, 1½, 2 and 3 They are sometimes made with a small tag to facilitate extraction, but in most cases this is unnecessary Since its position does not depend on the vaginal musculature—which is a variable factor—there is little likelihood that a refitting of the cap will become necessary except after childbirth

This cap can be recommended only when there is a well formed cervix, with no tear reaching to the base of the cervical tissue As with the Dumas cap, it is contra indicated if the axis of the cervix is at right angles to the vagina, as it is then liable to be dislodged by the penis (Fig 23) It is most suitable where the uterus is retroverted and the cervix presents in the axis of the vagina (Fig 24)

The cap is not intended to fit the cervix exactly The rim should normally lie round its base and the dome should extend further than the cervix, this surplus being for the reception of the cervical and uterine secretion, and of a contraceptive ointment When the cervix is shallow, this surplus may be excessive and tend to cause displacement of the cap by the penis In such a case, the same sized cap can be fitted, but with a shallower dome

The physical effects of this cap have been much discussed Theoretically, it might be expected that a rim tight enough to grip on to a slippery conical cervix would interfere with the blood supply to the part And this does happen on occasion, for after removal of a cap a temporarily constricted ring on the cervix has been observed both by the patient and the physician Nevertheless, cervices which have been treated in this way for many years are found to be in a perfectly healthy condition In general, a cap fitting at the base of the cervix with an ample surplus of dome is likely to be innocuous

In spite of the fact that cervical caps may adhere tightly they can allow excessive secretion from inside to escape round the edges Thus, patients have been known to forget about the cap and find it still in place after a normal menstrual period, apparently with no ill effect

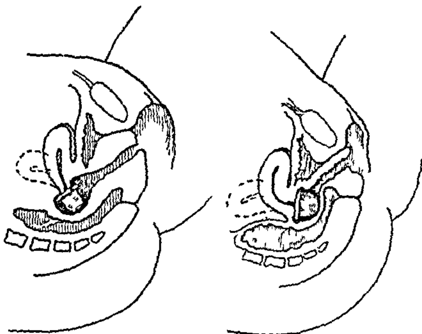


FIG 23 Cervical cap unsuitably chosen It would probably be dislodged by the husband

FIG 24 Cervical cap correctly chosen and placed

Some Advantages of the Cervical Cap

It takes up less room than any other cap, and leaves the maximum exposure of the vaginal walls

It is the only cap that a woman can buy for herself with a fair chance of getting a correct fit

It is hardly ever uncomfortable in use

It may sometimes be employed in cases of prolapse, particularly where the cervix is very long

Some Disadvantages of the Cervical Cap

It is very difficult for some women to adjust

Unless the slant of the cervix is entirely suitable, the cap is liable to be dislodged during coitus

Some cervical secretion tends to collect within the cap, and this is undesirable if there is a tendency to cervicitis

With this cap the pool of semen lies nearest to the cervical os, thus providing a shorter journey for the sperms than do larger types of cap

Insertion of the Cervical Cap

The cap is held by the patient between two fingers and inserted with the hollow facing upwards Once inside the vagina it is pushed up until it reaches the cervix and encloses it The cervix should always be located bulging through the surplus rubber of the dome and the rim of the cap should be pressed well on to the cervical base

Extraction of the Cervical Cap

When the cap is to be removed, the patient should attempt to hook off the rim with the tip of her finger, rather than pull on the dome or on the tag which is attached to some caps It is believed by some that prolapse and retroversion may be caused in women who repeatedly subject the cervix to a strong pulling action In any case, the suction can usually be relaxed first by the finger before extraction of the cap

Rigid Cervical Caps

A modification of the cervical cap should be mentioned here, although its use is not generally to be recommended It has been the custom on the Continent to fit women with small metal caps—much like a thimble—which are placed on the tip of the cervix, and adhere there by suction The cap is usually inserted by the physician at the end of menstruation, and displaced by the patient herself when the period begins The practice appears most questionable, and such caps are little employed in this country Yet patients are met with who have used them successfully for many years and who yet present a perfectly healthy-looking cervix

A variant of this cap, made of celluloid and shaped like a small bowl, is being used in Russia An English physician who saw this method in practice was surprised to note that the cervices were on the whole remarkably healthy It is there the custom for women to attend the factory clinic weekly by appointment and for the physician in charge to remove the cap and apply another sterilized one in its place The device seems to be about as effective as the ordinary removable occlusive cap

Vaginal Sponge

One further method remains to be mentioned—the use of a vaginal sponge in lieu of an occlusive cap It has been taught that this method is easy for a woman to apply herself, and that she should in addition soak the sponge in some spermicidal solution or paste In actual fact, even when chosen and fitted by an expert, a sponge seldom proves effective in occluding the cervix When a small sponge is chosen, the stretching of the vagina, combined with the coital movements, tend inevitably to dislodge it into one of the fornices If the sponge is too big to be dislodged, it will almost invariably cause dyspareunia to both partners

It is probable that even an indifferently fitting cap gives better protection than a sponge, so that the indications for this appliance are very limited

Summary

Many small details may be added to the above general outline Different makers provide modified types of cap (Vimule, Matrisalus, Hollow-rimmed cervical, etc) all of *which have their occasional uses There are many modifica*tions of technique, also, which can be applied to different couples and which make contraceptive instruction by no means as "mechanical" as it might appear The practitioner who is interested in sexual disorders and the psychoneuroses will find additional values in the work

In spite of the fact that there are some 160 clinics in this country which provide birth control advice, there are not nearly enough yet to meet the health requirements of the community Nor are there at present enough practitioners expert in the necessary technique Unless some new and simpler form of contraception is *devised, this field* of medicine is likely to present an opening particularly suitable for the married woman doctor who may be unable to meet the demands of more active general practice

CHAPTER EIGHTEEN

INTRA-CERVICAL AND INTRA-UTERINE APPLIANCES

Intra-cervical Appliances

The intra cervical appliances are made in several shapes and usually of gold or gold plated metal They comprise stems, studs and Y shaped devices known as wishbone pessaries (Figs 25 and 26) which are all used in the same

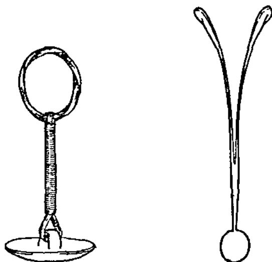


Fig 25 Intra-cervical stud pessary Fig 26 Intra-cervical wishbone pessary

way—namely, inserted in the cervical canal to reach, in some cases, beyond it to the body of the uterus, with the object of preventing nidation of the fertilized ovum The fact that such an appliance, once in place, calls for no special care on the patient s part, makes it a very tempting one to use But unfortunately its presence in the cervical canal is fraught with such danger that *there can be no justification for its employment in any circumstances* For one thing the appliance, being partly intra vaginal, forms a ladder along which infection can pass readily through the cervix beyond the normal barrier to infection—the internal os—into the body of the uterus Secondly, the friction of the metal

against the tissues of the cervical canal may be carcinogenic —and indeed cases of carcinoma growing round the stem of a wishbone pessary have actually been recorded The appliance has been responsible for many deaths and for some 400 cases of uterine infection (sometimes of perforation) reported in medical literature

Intra uterine Appliances

A distinction must be made between the intra cervical appliances described above and the Gräfenberg ring which is wholly intra uterine This appliance consists of a small ring of spirally coiled silver or gold wire which is inserted into the uterine cavity — with or without anæsthesia — and is retained by the woman, often for many months (Fig 27)

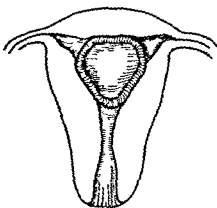


Fig 27 Gräfenberg ring in uterus

When this device was first introduced it was hoped that it would prove an ideal contraceptive *Being entirely intra-uterine* it was not likely to spread infection from the vagina or cervix into the body of the uterus, and, since the mucosa with which it was in contact was cast off and renewed in every menstrual cycle, there seemed little possibility of its producing a carcinomatous reaction

In practice, however, the method has often proved unsatisfactory and sometimes dangerous The insertion of the ring is followed in many cases by menorrhagia and dysmenorrhœa, accompanied only too often by subacute infections of the uterus and tubes Acute salpingitis may occur even in healthy nulliparæ, and dangerous complications often ensue in women who have previously had a pelvic infection or who develop gonorrhœa while the ring is *in situ* Such infection has been known to necessitate hysterectomy *Obviously a method which may cause endometritis*, salpingitis and even peritonitis must not be used for women whose child bearing still lies ahead of them

It is also noteworthy that in about one case in eight the ring is ejected from the uterus, occasionally without the patient's knowledge, and that in a high proportion of cases

(about one in four) it has to be removed because of uterine cramp Moreover, about five per cent of the women found suitable for the ring become pregnant notwithstanding its presence—a very high failure rate for so elaborate a method The pregnancy in such cases may end in abortion, but sometimes proceeds to term without apparent ill effect to mother or child

In spite of its grave disadvantages the use of the Gräfenberg ring may perhaps be justified in one type of case—namely, where contraception is imperative, but the husband and wife have a strong emotional bias against any other method For such a couple the insertion of a ring may make the difference between continuing the marriage or actual separation, but even then the method may be prescribed only if the genital tract is completely healthy and only if the woman fully realizes that the presence of the ring is neither free of risk nor a complete safeguard against conception It cannot be too strongly emphasized that for a nulliparous woman the choice of such an appliance is wholly unjustifiable

CHAPTER NINETEEN

THE PRE-MARITAL CONSULTATION

It is impossible to suggest an exact routine for pre marital contraceptive advice, for each couple presents an essentially individual problem All that need be said is that the physician accustomed to giving advice of this sort quickly learns to estimate the probable difficulties of the patient, and perhaps even of the other partner, merely from the hearsay evidence provided at the consultation

The request for such pre-marital instruction usually arises from the decision of the couple to postpone the first pregnancy until they have been married for a while Very often, before the consultation, they will have formed their own views on whether the responsibility for the necessary precautions should fall on the male or the female partner

If, as is usual, the man has the greater self confidence and experience, the use of the sheath may be recommended, but should he have a strong prejudice against this method, it is unwise to urge it upon him Similarly, it should be avoided for men who, like so many entering upon marriage, are concerned about their potency and feel increased anxiety at the prospect of using a sheath, and also for men who, lacking previous sexual experience, are likely to find the method exacting

For the many couples who are anxious to keep their sexual relationship unhampered by difficulties of contraceptive technique, the occlusive cap will usually prove more acceptable than the sheath When the woman is willing to undertake the contraceptive precautions, there is no reason why she should not learn to use a cap, provided that there is time before marriage for her to do so, and provided also that she and her future husband are willing to permit widening of the hymenal opening by a little gentle stretching To some women this suggestion proves repugnant, but to others the assurance that there need be no rupture of the hymen to cause pain during the first coitus brings great relief Many women have an exaggerated fear of the pain at defloration, and can be spared suffering

both in contemplation and in fact if the hymen is fully stretched before marriage

Stretching of the Hymen

The procedure is simple and, given enough time, most women can carry it through without pain or shock An interval of three or four weeks before marriage should generally suffice

Although the possibility of dilating the hymen may be discussed with engaged couples, it should never be urged upon them and never recommended without the full agreement of both partners

In any given case, an examination of the woman is necessary, for the size and thickness of the hymen vary considerably Complete absence of the hymen is by no means rare, whereas at the opposite extreme it may be so thick that penetration by natural means could hardly be effected In such cases the value of preliminary stretching or, more rarely, even of hymenectomy, may be very great A woman who experiences severe pain which is repeated each time coitus is attempted may sustain an emotional trauma much greater and more lasting than the physical one

Some women enter upon marriage with a great anxiety about a possible injury with loss of blood during coitus, and in consequence may suffer vaginismus and dyspareunia long after the defloration has been effected The treatment of dyspareunia has been described in Chapter 2, but it is well to realize that the condition can often be prevented by previous dilatation of the hymen It is by no means rare to come upon couples who have been married many months or even years without achieving full coitus In such cases, the woman should be reassured and shown how she herself can dilate the opening, for patients with dyspareunia generally bear self inflicted pain more easily than that which is caused by another person

Stretching of the hymen may be undertaken for a few minutes every day It can be done most conveniently in the half kneeling position, and when bathing The index finger, lubricated with ointment, locates the opening and the tip of the second finger is then inserted beside it Inward pressure of the fingers in this way very soon dilates the opening, and, after a few attempts, the tip of the third finger can also be introduced When the opening is large enough to admit three fingers, it is almost certain that the

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If, however, dilatation of the hymen is impossible, either because one of the partners dislikes the idea, or because there is not enough time to permit adequate stretching before marriage, the couple must be advised that, apart from the use of a sheath, there remain but two possible methods the use of contraceptive suppositories or the practice of withdrawal Sanction of the latter for more than a very short period is manifestly undesirable (see page 134), but where the practice is combined with the use of a suppository it may confer very adequate temporary protection until the hymen is stretched and sufficiently healed to permit the fitting of a cap The suppository recommended in such circumstances may sometimes with advantage be of the type with a cocoa butter base, for its shape and stiff consistency make it easier to insert than a suppository with a gelatin base All spermicidal preparations are liable to cause smarting of a torn hymen, but this is not usually severe enough to contra indicate their use

Summary and Conclusion

For many couples a pre marital consultation is of inestimable value It enables the practitioner to forestall any sexual difficulties that may arise and to assess the form that his advice should take on the subject of contraception In many cases he may judge that the æsthetic difficulties of contraception would loom so large that the couple would be better advised to permit a pregnancy to occur in the normal way and to postpone contraception until the sexual relationship has been well established It should be borne in mind that of the patients who come for pre marital contraceptive advice only a small minority wish to avoid parenthood altogether The majority desire merely to postpone pregnancy either for a few months or until such time as they have gained sufficient economic stability for the rearing of children or until they can be adequately housed

Nevertheless, the practitioner must face the fact that, only too commonly, couples who have learned a reliable method of contraception become so well adapted to the idea of avoiding pregnancy that they are liable to put off the attempt to start a family until their fertility has become greatly diminished or until they both feel ' too old ' for such a venture In warning patients of such misuse of contraception by nulliparous couples, he should bear in mind the fact that some truly maternal women avoid

woman will experience neither pain nor bleeding during coitus, and that she will be able to use an occlusive cap if she should so desire

In exceptional cases it may be necessary to perform this operation surgically If the hymen is not too thick, forcible stretching, which usually entails tearing can be carried out under gas anæsthesia Subsequent pain and bleeding should be negligible, and the patient can usually return home within an hour or two When the hymen is really thick, as it is in some middle-aged women, it may be wiser to incise it in three or four places and tie any bleeding points with catgut ligatures This operation can be performed under local anæsthesia, but if the woman is nervous a general anæsthetic should be given, followed by a day's rest in bed In every case it is best to allow as long an interval as possible before marriage, but when catgut ligatures have been used an interval of at least three weeks before coitus is desirable

Some patients, and possibly some physicians too, are opposed to stretching of the hymen on the grounds that it is not a strictly natural process, and this objection may be made on physiological or on psychological grounds Some authorities, however, hold that pain and bleeding on the consummation of marriage are not in themselves natural, for if the first coitus occurs at the physiologically correct time—that is, at puberty—the hymen is so yielding that pain is almost never experienced

The emotional objections may occasionally be so strong that, although the patient wishes to undertake the operation, she is unable to bring herself to it This aversion to touching the genitalia is not of course innate in human beings, as can be seen by the spontaneous behaviour of infants and very young children of both sexes But early training, particularly in the Victorian type of nursery, is so harsh and so impressive that few children arrive at adolescence without some fear or guilt associated with sexual matters The adult frequently interprets these feelings in terms of distaste, rather than in the more childish terms of fear and guilt, and although inhibitions which have been caused by severe training cannot be fully overcome by reason, it often helps the patient if this basis of the difficulty is explained She may then understand that some of her lifelong prejudices are no longer valid, and that they should have no place at all in the normal marriage relationship

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pregnancy only because their husband is not sufficiently encouraging, and may even believe that to press for children in such circumstances would be "selfish" In most cases the best advice to the couple is that they should start a pregnancy within the first year or two of marriage In this period the husband usually finds it easier to be unselfish than in later years, when the first "being in love" may have abated Most women are receptive to such advice, particularly if they are reminded that their fertility is quite unproved and that delay, should they happen to be subfertile, may be harmful If for nothing else, the pre marital consultation is of value in affording the practitioner an opportunity for instilling a realistic and responsible attitude to the use of contraceptives and to parenthood

In conclusion, a word may be said about the apparent capriciousness of some patients, who, while declaring that pregnancy is the last thing they desire, behave so carelessly with their contraceptive appliances that a pregnancy does in fact result at once There are women who repeatedly conceive in this way, their behaviour being apparently influenced by conflicting desires for the attainment and the avoidance of pregnancy

PART THREE

GENETICAL PROBLEMS IN GENERAL PRACTICE

CHAPTER TWENTY

GENETICAL PROGNOSIS AND ADVICE

by

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ANY attempt by a non clinician to give advice to physicians about their job needs an excuse In this case it is that the geneticist's insight into the physician's problems is probably not much inferior to the physician's genetical know ledge Furthermore, as the family doctor cannot avoid being asked questions, it would perhaps be unfair on the part of the geneticist not to try to help him So the blind and the lame may be allowed to walk together for a while and find out how far they can get

Present Limitations to the Knowledge of Human Genetics

It may as well be pointed out from the beginning that at present they cannot get very far There is still much con troversy, for instance, about the part played by heredity in the manifestation of such diseases as tuberculosis, most psychoses and even epilepsy Very few authorities would deny some genetical basis for these conditions, but just how important this may be is anybody's guess This unsatisfactory state of affairs is due probably less to deficiencies in genetical knowledge than to gaps in our insight into the ætiology of the conditions in question There is reason to believe that the genetical risk of contracting severe tuberculosis, insanity and epilepsy is greater if these conditions are common and severe in the families concerned, but in the present state of knowledge the matter cannot unfor tunately be stated in more definite terms

Useful eugenic advice at present consists largely in undoing the harm that has been done by propaganda and counter propaganda based on rudimentary scientific knowledge The discouragement of marriage or offspring for genetical reasons alone is fortunately much less often indicated than some anxious couples think Most prognoses, whether of disease or special gifts, are judgements of pro bability Nevertheless, the preventive use of human

genetics will undoubtedly increase as science progresses It will do so in two ways first, by offering more precise indications for negative measures, and secondly by making available positive help to genetically threatened individuals

Obviously this chapter cannot take the place of genetical training or obviate the need for consulting a text book of medical genetics in special cases It can only try to offer guidance—within the scope of genetics—on the general principles that should animate the practitioner when con fronted with such questions as "Should we marry?" or "If we marry, should we have children?" In so far as these doubts turn on genetical factors, a direct answer should seldom be attempted The physician should confine him self to explaining to prospective parents the chances of their children inheriting any diseases which have become manifest in themselves or in their families Questions con cerning the prevention or appropriate early treatment of such genetically determined diseases as erythroblastosis fœtalis or hypertrophic pyloric stenosis can of course be directly answered This information, with some account of the incidence of the conditions in the general population, should enable the couple to draw their own conclusions

The Physician's Responsibility in Genetical Matters

The public expects the general practitioner or specialist to approach problems of disease in a manner very different from that of the eugenist, sociologist or politician For instance, the prevention of the birth of a child which will later suffer from and perhaps transmit Huntington s chorea may not be very important nationally, but for the parents and the child concerned it is of the greatest impor tance Such disparity between the social and individual outlook on disease is not confined to conditions under con spicuous genetical control Many more working hours are probably lost in Europe by transitory colds, coughs and sore throats than by cancer, but cancer is still regarded as infinitely the more important disease

The possible dysgenic effects of almost any medical or social advance have been stressed by advocates of com pulsory sterilization, and although this is not the place to discuss the merits or demerits of their case, it must be emphasized that it is difficult if not impossible to reconcile the role of the doctor, concerned as a friend with the well-being of his patients, with that of the eugenist concerned, often in a utopian spirit, with the qualities of remote

posterity In his daily practice the physician has to help those who consult him, and the sole purpose of this chapter is to indicate how a knowledge of genetics can contribute to this end It should be realized that besides genetical factors there are many others that may determine the doctor s final conclusion

Information Needed for Genetical Prediction

Genetical prediction concerning the offspring of any given couple should ideally be based on three groups of information

(1) On the *pedigrees* of the prospective parents for two to three generations, with full data about any children already born to them

(2) The *exact diagnosis* and description of all persons in the pedigrees showing hereditary traits, and clear evidence of their absence in the others

(3) A sufficient knowledge of the mode of inheritance of the conditions concerned

Most doctors would agree that access to such complete data is the exception rather than the rule While it is true that detailed genetical knowledge of the suspected conditions would facilitate both the construction of pedigrees and the individual diagnosis, such knowledge cannot usually be expected of the physician, indeed the data obtained by him are only too often inadequate to justify a genetic prognosis But whoever attempts this task will have to rely mainly on the practitioner's pedigrees and diagnoses, and some basic advice on how to obtain these may therefore be helpful Guidance on the point is given by the Eugenics Society [1]

Verification of Diagnosis

The first step, which must be taken jointly by the inquirers and the physician, is to verify any diagnostic information and to gather more facts The inquirers are of course available in person and can normally describe their condition and give the sources (e g doctors and hospitals) from which their reports may if necessary be checked Furthermore, they can and should be clinically overhauled Living relatives are sometimes willing to submit to the same procedure, but more often the doctor must depend on reports by the inquirer or by other doctors, nurses, social workers hospitals or institutions The established

[1] *How to Prepare a Family Pedigree* Copies may be obtained from the Eugenics Society 69 Eccleston Square London S W 1 price 8d including postage

family doctor is sometimes in the happy position of already having some first-hand information about past events, and this and the reports mentioned are of course the only sources of information concerning dead members of the family It should be added that to elicit all these facts calls for a good deal of detective ability and clerical work

A Simple Situation

The most important people are usually the couple themselves, and sometimes it is practically possible to base one's prediction on them alone We may take as a hypothetical example the problem presented by that well defined and rare recessive condition alcaptonuria Let it be supposed that the man, who is himself the product of a cousin marriage, shows all the symptoms of the anomaly and that these are also present in one of his four sisters The woman who is no relation of his does not know of any alcaptonuric ancestry What are the chances of their children being affected or transmitters? The answer to the first question cannot be given with great accuracy, for the frequency of the gene responsible for this condition is not exactly known But estimating that it would occur once in every 500 chromosomes where it is localized, the chances of a child of this couple being affected would be 1 in 500 as compared with 1 in 250,000 in the general population This value is relatively high but absolutely negligible On the other hand, the chances that any child of this couple will transmit one alcaptonuric gene to half its offspring, without itself showing alcaptonuria, is very slightly over one-half It must be repeated that these probabilities are based entirely on the statement that the couple are really not consanguineous

Prediction becomes less certain when the mode of inheritance conforms less to pattern than in alcaptonuria For instance, general albinism, like alcaptonuria, appears as a simple recessive in most pedigrees But some pedigrees indicate different modes of inheritance for clinically similar conditions The doctor should therefore try to satisfy himself whether he is dealing with the recessive form or not This form could be reasonably assumed if an albinoid condition were present in one or more sibs of the affected person or if his parents were consanguineous

Cousin Marriage

Consanguinity is often the couple's reason for consulting a doctor before marriage, and in this section

the problem will be discussed in the form in which it usually arises, namely in the proposed marriage of cousins If there is no reason to suspect the presence of a recessive, the doctor can only explain in general terms that, though the chances of the children of such a marriage exhibiting some unspecified recessive condition are higher than the average, the majority can be expected to be quite healthy

Diagnostic Advances

On the other hand, genetical prediction grows in accuracy with almost every advance in the clinical diagnosis of the conditions concerned Subclinical symptoms will consequently play an ever increasing part in human genetics and, where they can be ascertained with accuracy, prove of immediate help to the practitioner Some examples may be cited from recent genetical literature

The first concerns the so called congenital dislocation of the hip This condition, which is four to five times as frequent in girls as in boys, was regarded as an irregular dominant as long as only the individuals showing the fully developed dislocation were taken into account, and on this basis prediction remained very uncertain The application of modern X ray methods, however, and especially the careful analysis of radiographs of apparently unaffected members of families in which the clinically manifest condition is present, have shown that its dominance is fairly regular and that the sexes are equally affected [1]

If, then, the unaffected brother of a girl who has suffered from congenital dislocation of the hip asks what the chances are of his transmitting the defect to his children, he should be advised to have an X-ray picture of his pelvis submitted to an expert for examination If no abnormality is found in the configuration of his acetabulum the risk that he may be a carrier and transmit the morbid gene appears decreased If, on the other hand, he shows defective ossification, indicating that he might have developed a luxation himself, he will transmit a morbid gene to half his children, but because of its low and sexually different penetrance the chances of disablement in his sons will be only about 1 in 40 and of his daughters about 1 in 10

Late and variable onset represent another diagnostic difficulty Huntington's chorea frequently becomes manifest only when the individual has already begotten all his or her children Premonitory symptoms of a neuromuscular

[1] Faber A (1938)

character have been described in younger members of affected families, but sometimes they seem to be absent or tardy Here again, the discovery of consistent early diagnostic signs, perhaps of a chemical nature, would practically solve the problem of genetical prediction

Otosclerosis may present the same difficulty but often however it has a somewhat earlier onset In this condition too, pre-clinical early diagnosis in members of affected families might often be of the greatest value

Conductors in Hæmophilia

It is common knowledge that a man suffering from true hæmophilia does not transmit his disability to his sons, who therefore need not fear that they will transmit any further, but half his daughters are carriers, i e half the total number *of their sons will be bleeders For a genetical prognosis it is* now very important to know whether the daughter of a hæmophilic father is likely to transmit the condition or not *Reports of "sub-hæmophilic women" in bleeders' families* have for a long time encouraged the hope that it would some day be possible to diagnose every female carrier of hæmophilia, and the possibility that expert clinical hæmatologists will be able to do just this seems at last about to be realized

Epilepsy and Mental Defect

Epilepsy and mental defect are caused by numerous environmental and genetical factors All that can generally be said is that the chances of morbid inheritance in families which include several epileptics or mentally defectives are greater than in the general population But only a very careful clinical investigation and a comprehensive study of the family can show whether these chances are particularly great or small in any individual case

Sometimes, as in traumatic epilepsy, a non genetical causation may be detected, and no question of inheritance is then involved Many cases of deafness and blindness fall in the same class and a carefully checked family history can often dispel unfounded fears Fortunately, many of the histories of "mental disorder' which alarm a couple turn out on investigation to have been non-inheritable *conditions,* such as G P I, post encephalitic symptoms, or senile or toxic dementia, and among the mentally defectives may be found many who were backward only on account of birth injury, syphilis or meningitis

Mongolism, and deficiencies due to icterus gravis (erythroblastosis fœtalis) will be discussed later (see page 204)

Tuberculosis

Many tuberculous persons are anxious about the chances of their offspring acquiring the disease It is common knowledge that very few adults in our urban civilization have entirely escaped infection by the tubercle bacillus, and it thus follows that Pearl's estimate of the chances of contracting the disease—namely that they are about four times as great if both parents have been infected than if neither has—cannot apply to primary tuberculosis but only to some graver manifestation of the disease Even on this interpretation Pearl's findings do not in themselves offer definite guidance on the risk to the offspring of tuberculous parents For one thing the chances in any given case turn largely on environmental factors, and furthermore it is well known that most cases of the developed disease respond very well to the methods of treatment now available Granted all this, it should still be realized that there exist some families in which tuberculosis is common and severe in the absence of any obvious precipitating factors in the environment (apart of course from exposure to infection) Experience shows that children born to affected parents in such families do run a considerable risk of developing the disease in one of its graver forms, and weight must be given to this fact in the genetic prognosis

Selective Mating

The deaf, the blind, and to some extent the feeble-minded show, within each group, a tendency of like to mate with like If their condition is predominantly caused by one recessive factor, as for instance among the deaf-mutes, we may expect all the offspring to be affected—a very strong indication for advising against parenthood Marriage between members of such families must be regarded, as far as the common gene is concerned, as consanguineous Thus if a hereditarily deaf mute girl marries the unaffected brother of a similar deaf mute schoolmate, the chances, if both her parents in law have had good hearing, would still be that half the children would be deaf mutes and the other half capable of transmitting the condition to their children

In general, when both parents are liable to transmit

precisely the same condition, the risks are not merely doubled but increased many times

Familial Disabilities of Complex Genetical and Environmental Origin

There are still all too many hereditary syndromes and conditions about which almost every detail is uncertain Forms of blindness, cataract, diabetes and physiological characters like hair and skin colour, which are physically and morphologically indistinguishable, show a bewildering irregularity in their heredity Thus it seems that different genes may cause indistinguishable end-effects

The confusion is increased by the possibility of one gene manifesting itself in different individuals in a number of different ways, the connection between these manifestations being very often obscure at first glance and only to be elucidated by thorough pathological study Investigations of such a situation, difficult enough in experimental animals, are only exceptionally possible in man However, a *few examples can be given with some confidence* achlorhydria[1] occurring in families is associated in some members with pernicious anæmia and its nervous symptoms but not in others, blue sclerotics occurring in one family may or may not be associated with brittle bones or with the development of deafness in the third or fourth decade In fact each condition and each hereditary complex must be investigated on its own merits and frequently by new methods, generally speaking there can be no short cuts to a solution

General Non specific Risks and Special Risks

The chances of being born bodily or mentally ill or of developing illnesses are quite considerable, but it is difficult to assess how far genetical factors are responsible Thus, the Mental Deficiency Committee of 1929 estimated the percentage of mental defectives in England and Wales as about 8 per 1000 Much higher estimates have appeared in the U S A and Germany These differences are largely due to the difficulty of drawing the line between feeble mindedness and normality Among English defectives the extreme forms have proved more sporadic than the milder forms, but there is little doubt that in both classes heredity is a considerable factor There is probably a chance of about 2 per 1000 that a child taken at random will be mentally defective

[1] Williamson J F and Brockbank W (1931)

On the other hand Penrose (1939) has calculated the expectations of children born to normal parents who have already had one imbecile, idiotic or unspecified mentally defective child If the parents are unrelated the chances that any further child will be normal is 90 1 per cent, 5 2 per cent will be dull, 1 6 per cent simpletons, and 2 7 per cent imbeciles or idiots If, in similar circumstances, the parents are normal and consanguineous only 79 6 per cent of further children may be expected to be normal, 2 per cent will probably be dull, 4 1 per cent simpletons, and 14 3 per cent imbeciles or idiots Affected parents produce a higher proportion of affected children

Similarly, insanity is widely spread in the general population At the end of 1941 there were 556,000 patients on the books of all U S A hospitals for mental disease, i e more than 3 6 per 1000 Considering that hardly any children are found in these institutions and that more people are at least temporarily discharged from them than die during their first admission, considerably more than 1 per cent of all citizens of the U S A must spend a shorter or longer period of their life in an institution for the insane The familial incidence of the individual conditions responsible for this varies a good deal, but nearly all of them are partly of genetical origin and at the same time widely scattered in the population It thus appears that in civilized countries the chances of a child chosen at random spending some time of its life in an institution for the insane is round about 1 per cent

This estimate applies, as we have said, to a random sample Most investigators would agree, however, that the chances of a child becoming an inmate of an institution and remaining there are greater if there is much insanity among its relatives, but again, estimates of the magnitude of these chances vary enormously At one extreme we have the assumption that such a child will certainly find its way into an institution, and at the other we have the equally remote assumption that its chances of doing so are insignificant All that can be said is that reliable estimates of the risk will become possible only when the diagnosis and ætiology of the various types of insanity are based on firmer ground than at present

Even higher, though less well documented, is the incidence of dispositions to allergy, such as hay fever, food allergies, asthma and eczema which, although apparently familial, are so frequent that few families lack affected

members Contrasted with such figures, especially when they are added up, many "specific risks" do not seem particularly great

Non genetical and Genetical Considerations

On the other hand there is little doubt that, in prevailing *social conditions*, the prospects for any children of most mentally defective or insane parents are very bleak, whether they are genetically healthy or not, and as there is ample evidence that many of them will not be healthy, this will provide an added reason against procreation

This is not the place to discuss the existence or otherwise of the so-called social problem group, nor is it possible to attempt an assessment of the degree to which heredity and environment contribute to the greater incidence of mental defect and insanity in certain families More often than not such families come under the care of a health officer and thus do not consult the general practitioner There remain for discussion a few situations in which genetical prediction is demanded fairly frequently and can in fact be made with some certainty Sometimes a couple, having already produced one or several diseased children, inquire into the chances of any further offspring being affected In the case of a "good recessive", such as amaurotic idiocy, phenylketonuria or "sporadic" deaf mutism, the probability of any further child being affected is roughly 1 in 4 and the chance of its being a "carrier' is roughly 1 in 2

Antigenic Incompatibility

Diseases caused by antigenic incompatibility of mother and fœtus (genetical incompatibility of father and mother) form a separate class The vast majority of cases of ery throblastosis fœtalis occur in the second, third or later pregnancy of Rhesus negative mothers Having been sensi tized by a previous Rhesus positive fœtus such mothers produce antibodies deleterious to the embryo Fortunately, only a small percentage of Rhesus negative mothers become sensitized, furthermore it is possible to save a high proportion of the dangerously jaundiced babies by a suitable transfusion Early serological testing of the parents and children can often help to save the life of the newborn infant, who in respect of the Rh factor will conform genetically to the majority of the population

It is possible that mongolism can also be classed as caused by maternal incompatibility The probability of a

further mongol being born after a mongol sib depends largely on the maternal age In a young mother who has produced several healthy children after an early mongol the chances of a further non mongol child are good In women of about forty and older who produced their first mongol child late in the sibship, the probability of a further child being a mongol is considerable The detection of sub clinical forms of mongolism is progressing and may eventually help in the prognosis

Sterility

The problems of human sterility are discussed elsewhere in this book, but it is worth recording that in a number of cases childlessness appears to be due to some incom patibility between the couple, whether psychological, physiological, anatomical or antigenic The couple, in short, though infertile with each other are capable of pro creation with a different partner The issue must usually remain uncertain, for this is a field in which there can be few experimental data

It should be added that in cases of infertility the occasions are rare in which the doctor should advise against procreation on genetical grounds alone Rather more often unfavourable factors, not directly concerned with the genotype of prospective children, may be reinforced by high expectations of an undesirable genotype On the positive side, genetical knowledge sometimes enables the physician to dispel unfounded or exaggerated fears, to perfect his diagnoses, and to suggest and carry out pro phylactic and therapeutic measures for the benefit of his patients and their progeny

Conclusion

Finally, a plea may be made on behalf of human genetics in the medical curriculum The subject is one that should be taken just as seriously and taught as thoroughly as any speciality in post graduate courses Nobody is expected to perform even a routine Wassermann examination without having spent a few months in the laboratory Yet many physicians fail to realize that genetical prognosis involves not less expert knowledge and training and should be undertaken only on the basis of knowledge and experience in which the study of human genetics forms an essential part

CHAPTER TWENTY-ONE

EUGENIC STERILIZATION

THE previous chapter refers in one place to the misguided advocacy of compulsory sterilization as a means of eliminating genetical defects, but it should be emphasized that this expedient has never been supported by any influential body of British eugenists In fact, the whole weight of informed opinion, as represented by the Eugenics Society, has been against permitting compulsory sterilization in any circumstances whatever, and even voluntary sterilization is supported only under the most stringent safeguards and with a full sense of its limitations as a negative eugenics measure

A dispassionate examination of the evidence soon shows how very little can be achieved by a policy of sterilization, however vigorously pursued In the first place, such a policy could only be applied, with negligible exceptions, to actual sufferers from inborn defects or diseases It could not touch the very large numbers of apparently healthy carriers of hereditary defects—that is to say, persons liable to transmit to posterity defects which they do not manifest themselves In a very few instances such carriers can be detected for instance, in the case of hæmophilia by the hæmatological examination of women whose family history suggests that they may possibly be transmitters But in general the available methods for detecting carriers are laborious, incomplete and unreliable, and until better methods are discovered by further genetical research, carriers will continue to transmit hereditary defects, no matter how effectively sterilization may be applied to persons known to suffer from them

The potential achievement of eugenic sterilization is further limited by the fact that its widespread adoption can be expected only if the persons most closely concerned have a responsible attitude towards parenthood Such an attitude is not uncommon in persons with bodily defects, but is inevitably rare in those afflicted in the mind Nor is it to be expected in the large group of mentally subnormal persons

who, though not certifiably defective, are yet lacking in ordinary prudence or foresight Nevertheless, many persons with mild degrees of mental defect are aware that they would not make good parents and would be glad, if they had the chance, to be rid of the burden of their unwanted and genetically undesirable fertility

It should be added that the problems of genetical disease would still remain even in the unlikely event of sterilization being adopted for all transmitters New hereditary defects would continue to arise by mutation, as they do now in families which, as far as is known, have never shown them before

Without underrating these limitations on negative eugenics, it is still reasonable to hold that it is better to make some effort to eliminate hereditary defects, however gradually, than to let them multiply for lack of forethought and effort Even if its effects on posterity were negligible, sterilization could be justified in many cases by the contribution it could make to human happiness here and now

The Legal Problem

The practitioner who holds these views is faced with a very difficult problem At the present time eugenic sterilization, as distinct from sterilization for therapeutic ends, is illegal in Britain The operation is not legalized by the consent of the patient or by the practitioner's conviction that the patient's fertility constitutes a menace to posterity If two or more practitioners agree, on unimpeachable grounds, that the operation would prevent the birth of hereditarily diseased children and would make all the difference to the patient's chances of marital happiness, even that would not safeguard them against the charge of performing an illegal operation

To these statements, however, there is one very important qualification Although eugenic sterilization is illegal, no surgeon who has carried it out has yet had to answer for his action in a court of law It has even been held by some authorities, notably by the late Mr Havelock Ellis, that against a practitioner of good repute such an action could not possibly succeed Havelock Ellis, indeed, was opposed to the enactment of a law permitting eugenic sterilization, for fear that its clauses would inevitably include so many safeguards that the procedure "would be strangled with red tape"

The Brock Committee

In an attempt to clarify the position an influential departmental committee, under the chairmanship of Mr L G (now Sir Lawrence) Brock, was set up in 1932 "to examine and report on the information already available regarding the hereditary transmission and other causes of mental disorder and deficiency, to consider the value of sterilization as a preventive measure having regard to its physical, psychological, and social effects and to the experience of legislation in other countries permitting it, and to suggest what further inquiries might usefully be undertaken in this connexion" This committee, after taking evidence from leading medical, legal and genetical authorities, and studying reports from countries which already had sterilization laws (e g Denmark and several American states and Canadian provinces), recommended that voluntary sterilization be legalized for mental defectives and persons who had suffered from mental disorders, for persons suffering from or believed to be carriers of grave physical disabilities known to be transmissible, and for persons believed to be likely to transmit mental disorder or defect

Naturally, the committee proposed safeguards to ensure that the operation would in fact be voluntary and carried out only for the recommended purposes Thus, it recommended that the candidate for sterilization should himself apply after having first informed his partner if married, *that in the case of persons deemed to be so defective as to* be incapable of expressing willingness or unwillingness, the application should be made by the parent or guardian, that *each application should be supported by two medical* practitioners, of whom one should if possible be the family doctor and the other an expert in hereditary diseases, and finally that the operation should be sanctioned by the Ministry of Health

All, it must be agreed, very reasonable and moderate, yet there the matter ended, for the recommendations of the Brock Committee have still to come before Parliament and until that happens no one can say for certain what would be the fate of a practitioner charged with sterilizing a patient for eugenic purposes

Some Practical Suggestions

Nevertheless, it is possible to offer some practical suggestions in the matter First and foremost, the operation—whether vasectomy or vasoligature in the male or section or

ligature of the fallopian tubes in the female—should never be carried out unless the eugenic indications are unequivocal The genetical analysis should be exhaustive, and if there is any reasonable doubt the data should be submitted to the adjudication of an expert geneticist Indeed, a consultation with an authority on the condition of which the patient is believed to be a carrier is desirable in all cases

Secondly, the mere consent of the patient should not be regarded as a sufficient sanction for the operation The practitioner should make certain that the patient fully understands the implications of his request—particularly the fact that the operation, even if one of the so-called reversible procedures is used, may be irrevocable And although the consent or even importunity of the patient would not be an answer to a criminal charge, and might indeed be regarded as proving conspiracy between the sterilized person and the doctor, nevertheless such consent should be obtained in writing, as for any other operative procedure

Finally, the practitioner should never allow himself to be inveigled into performing the operation for dubious reasons Couples who ask for sterilization on the ground that it is easier and more reliable than birth control need, and should receive, a lesson in social responsibility Sometimes the problem is less simple, as for instance, when a man asks to be sterilized because pregnancy would be dangerous to his wife or because his wife is a carrier of genetical defect It is understandable, and even laudable, that the man should wish to spare his wife the ordeal of a major surgical operation by undergoing a comparatively minor operation himself For all that to accede to such a request would transgress medical ethics and almost certainly be legally indictable The practitioner should point out to the patient that sterilization may mean the relinquishment of his fertility for ever not only with his present wife but, in the event of her death, with any woman he may happen to marry after It would make a mockery of eugenic sterilization if the operation were applied to the genetically well-endowed instead of to the affected partner in the marriage

Results of Sterilization

The question sometimes arises whether sterilization is liable to have any undesirable by effects, physical or psychological Neither vasectomy or vasoligature in the male nor operations on the fallopian tubes in the female appear

to affect sexual desire, capacity or pleasure one way or the other Vasoligature was formerly advocated as a means of enhancing sexual potency, but the results were to say the least disputable The psychological effects of the procedure are usually good The person who voluntarily seeks eugenic sterilization is usually oppressed by the fear of producing genetically ill endowed offspring, and enjoys an immediate sense of release when this fear has been removed

Summary and Conclusion

Eugenic sterilization is legal in a number of countries but an offence in British law Admittedly no action has yet been taken under the relevant statute (the Offences against the Person Act of 1861), but the existence of this statute has undoubtedly deterred institutions and private practitioners from carrying out the operation This fact came out in evidence given before the Brock Committee by representatives of the British Medical Association, who stated that "many doctors would refuse to make the necessary recommendations unless they could be given some protection against vexatious legal proceedings", and by hospital authorities who stated that they would on no account permit the operation until it was legalized

A minority of practitioners, however, share Havelock Ellis s view that eugenic sterilization carried out in good faith and with the patient's full concurrence would not be actionable, and there are some who would rather take their chance of prosecution than turn away patients liable to transmit dangerous defects to posterity The recommendations in this chapter concern some of the more important safeguards that should be adopted by such practitioners in their own and their patients' interests

APPENDICES

APPENDIX ONE

EXISTING CONTRACEPTIVE AND SUB FERTILITY SERVICES

THE existing facilities for dealing with problems of fertility are urgently in need of extension

Contraceptive services are far more satisfactory than those for the investigation and treatment of subfertility, yet there is still much marital suffering and frequent recourse to abortion among town and country women for whom there are no easily accessible centres for the provision of the necessary guidance To help such women several organizations were started some twenty five years ago with the aim of disseminating birth control information, establishing birth control clinics, studying contraceptive methods and urging the Ministry of Health to permit local authorities to offer birth control instruction in clinics conducted under their auspices All these organizations (with the exception of the Con structive Birth Control Society founded by Dr Marie Stopes) are now incorporated in the Family Planning Association which under the presidency of Lord Horder, carries on its work through medical and lay committees

The Family Planning Association has over sixty branches in England and Wales nearly all of which are responsible for clinics for the benefit of poor families in need of contraceptive advice It also collaborates extensively with local authorities in providing advice in cases in which further pregnancy would be detrimental to health Through its medical committee it has conducted and continues to conduct, research upon various aspects of contracep tion and has made itself responsible for the testing of the dependa bility and other qualities of proprietary contraceptives Many such preparations have been found to be worthless, some definitely harmful With the invaluable help of the Eugenics Society the Association organized a team of research workers who devised *standard tests for spermicidal and rubber products* and on the basis of this work drew up its periodically revised ' approved list of contraceptives As rubber deteriorates with age manu facturers whose products are included in the list are required to mark them with the date of manufacture It is evident that through these activities of the Association the public enjoys a measure of protection against worthless contraceptives, for chemists and other retailers prefer to stock products which bear the stamp of the Association s approval The approved lists and the detailed reports on the tests carried out have also helped medical

practitioners to choose, from the many preparations offered for their approval, those best adapted to the needs of their patients The latest approved list is published as Appendix 3 on page 227, and copies are available to medical practitioners on application to the Family Planning Association (price 6d post free) Further guidance is offered to practitioners as well as to students of medicine at the regular teaching sessions and lectures and at the periodical conferences which are organized by the Association throughout the country Systematic instruction is most readily available at some of the larger London clinics

Subfertility

As work proceeded at the F P A clinics it became evident that many working class women attended in the hope of obtaining advice on gynæcological difficulties, and on sterility A number of clinics arranged special gynæcological sessions, and the Exeter clinic, under the direction of Dr Margaret Jackson, was the first to build up, where necessary in collaboration with the local hospitals, a comprehensive service for the investigation and treatment of subfertile couples Other clinics followed suit and such facilities are now available in many parts of the country though not yet in nearly enough Some of the smaller clinics feel themselves too inadequately equipped to do more than give preliminary advice, but even this is frequently enough to direct the couples concerned to hospitals, clinics or practitioners competent to conduct full investigation and treatment

On the other side it must be pointed out that though a few teaching hospitals are opening fertility clinics, these, in most cases, still offer a most inadequate service Thus, only a minority have proper facilities for seminological investigation or for the treatment of subfertility in the male partner In the great majority of country places there are no suitable centres to which subfertile couples can turn for help and guidance In a few counties working class couples may be able to secure the necessary help at their local hospital, or sometimes at an F P A clinic But in general, in relation to the demand, the supply is hopelessly inadequate A list of the clinics which give advice may be found in Appendix 2

When the F P A began to include the investigation and treatment of subfertility among its services an outstanding difficulty arose from the dearth of seminologists competent to carry out analyses of semen and make dependable reports on their findings To meet this difficulty the Association, in 1945 founded a seminological laboratory at 33 Wimpole Street, London W 1, to which private as well as clinic patients could be referred This laboratory is now working to full capacity, collaborating with various hospital departments as well as with F P A clinics and private practitioners

While believing that these services have been of great value to the community in general and to working class families in par

ticular, the F P A feels that it is undesirable that they should be left so largely in the hands of voluntary organizations It hopes that both contraceptive and subfertility clinics will be established on a sufficiently extensive scale as Public Health services, and indeed that the widespread establishment of such clinics will supersede the work of the F P A entirely

In the meantime inquiries about available services may be made to the Secretary Family Planning Association, 69 Eccleston Square London S W 1 A stamped and addressed envelope for reply should be enclosed Since the funds of the Association are as low as the demands made upon it are high, subscriptions from new members or donations are always welcome.

APPENDIX TWO

VOLUNTARY CLINICS UNDER THE AUSPICES OF THE FAMILY PLANNING ASSOCIATION

CLINICS are run by local committees and, except for the medical and nursing personnel, the services given are in nearly all cases voluntary Some clinics receive grants or per capita fees from the local health authorities All patients are seen by the medical officer

Some 100,000 women attend the clinics every year It is the belief of the F P A that these services should be extended and taken over by the Ministry of Health

Initial advice on subfertility is available at most clinics, and, where possible, the local centres for major investigations have been listed Clinics marked with an asterisk (*) hold special sub fertility sessions and usually undertake full investigations (insufflation etc) themselves

The following details are correct for August 1950 but changes of days and times may occur, and new clinics are sometimes added The latest list of clinics can be obtained (6d post free) from the Family Planning Association, 64 Sloane Street, London, S W 1, or practitioners can apply to the secretary of their nearest centre for fuller details of hours, etc Many clinics close during August or Bank Holiday week

LONDON AND DISTRICT

Carshalton and District F P A , Welfare Centre Wrythe Lane, Carshalton, Surrey (Opposite Tudor Post Office, 157 bus passes the door) Wednesdays 10 0—11 30 a m Thursdays 2 0—3 30 p m (Closed Easter and Christmas weeks and August month)

Croydon F P A , 33 St James s Road, Croydon, Surrey (New patients please write or phone for appointment) 'Phone Thornton Heath 2802 Wednesdays 2 0—3 30 p m and 6 30—8 0 p m Thursdays 10 15—12 0 noon, 2 0—3 30 p m and 6 30—8 0 p m (Closed Easter and Christmas weeks and 2 weeks August)

Dagenham and District Birth Control Clinic, Ashton Gardens, High Road, Chadwell Heath, Essex (near Whalebone Lane) Wednesdays 2 0—4 0 p m (By appointment)

*Greenwich Branch F P A , Charlton Lane Welfare Centre, Charlton Lane S E 7 Wednesdays 2 0—4 0 p m Sub fertility 1st Wednesday in month 4 30—6 0 p m Any Wednesday between 2 0—4 0 p m by appointment (Greenwich 1034) (Closed Christmas, Easter Whitsun and all August)

Hackney and Stoke Newington Branch, F P A 2 4 Warwick Grove, Upper Clapton Road, E 8 Wednesdays 6 30—8 0 p m (by appointment) (Closed August month)

Hornsey Branch F P A , Welfare Centre, Town Hall, Hornsey, N 8 Mondays 6 30—8 0 p m (Closed all Bank Holidays and August)

Islington Clinic, 39 Spencer Street Goswell Road E C 1 (Near The Angel Underground Station) Phone Clerkenwell 7086 Tuesdays Wednesdays and Fridays 2 0—3 30 p m , Mondays and Thursdays 6 0—7 0 p m

Branch

Marylebone Lisson Grove Welfare Centre, 217 Lissson Grove, Marylebone, N W 8 Mondays 6 0—7 0 p m

*North Kensington Women's Welfare Centre 12 Telford Road Ladbrooke Grove, W 10 , 'phone Ladbrooke 2532 Birth Control Mondays and Fridays 2 0—3 0 p m Tuesdays and Wednesdays 6 0—7 0 p m Gynæcology Thursdays 2 0—3 30 p m Sub fertility Thursday afternoons (by appointment) Remedial Exercises Tuesdays 2 0—3 30 p m Marital and Nervous Problems Thursdays 2 0—3 0 p m (Closed Christmas week)

Branch Clinics (Birth Control and Gynæcology)

Acton The Mission Hall, Palmerston Road, Wednesdays 1 45—2 45 p m

Battersea The Youth Centre, 34 York Road, S W 11 Tuesdays 10 0—11 0 a m , 1 45—2 45 p m

Edgware The Watling Centre, Orange Hill Road Tuesdays 10 0—11 0 a m

Hayes Minet Clinic, Coldharbour Lane, Middlesex Wednesdays 1 45—2 45 p m

Hounslow Labour Hall 20 Heath Road, Hounslow, Middlesex. Mondays 1 45—2 45 p m and 5 30—6 30 p m , Thursdays 10 0—11 0 a m , Fridays 1 45—2 45 p m

*North West London Women s Welfare Centre, 80 West End Lane, Kilburn, N W 6 Tuesdays 10 0—11 0 a m Wednesdays 2 30—3 30 p m , Thursdays 5 30—6 30 p m Sub Fertility 2nd and 4th Wednesdays in the month, 5 0—6 0 p m (by appointment) Marriage Guidance 4th Wednesday in the month (by appointment)

Richmond Mothers Advisory Clinic Health Centre Windham Road Richmond, Surrey Tuesdays 5 30—7 0 p m , Thursdays 6 45—8 0 p m (Closed during August)

Walworth Women s Welfare Centre 153a East Street S E 17 (Nearest Station, Elephant and Castle) New patients please

write or 'phone for appointment 'Phone Rodney 3262 Birth Control and Gynæcology Tuesdays 2 0—4 0 p m , Thursdays 1 30—3 0 p m and 5 30—7 30 p m , Fridays 2 0—4 0 p m

Bow, E 3 Maternity and Child Welfare Centre, Wellington Way, Bow, E 3 Mondays and Fridays 10 0—11 0 a m

Camberwell Summer Road Infant Welfare Centre, Basingstoke House, Sumner Road, S E 15 Tuesdays 5 30—7 0 p m (Closed Christmas, Easter and Whitsun weeks and all August)

Stepney, E 3 East London Women s Welfare Centre, 6 Burdett Road, Stepney, E 3 Mondays and Wednesdays 2 0—3 30 p m

Consort Road Infant Welfare Centre, Consort Road, S E Thursdays 9 30—11 30 a m

Tulse Hill Branch F P A , Purser House, Tulse Hill, S W 2 Wednesdays 5 30—7 0 p m (Closed Christmas and Easter weeks and all August)

PROVINCES

Ashington Women's Advisory Clinic, Child Welfare Centre, South View, Ashington, Northumberland 2nd Friday in the month 2 0—4 0 p m and 5 0—6 30 p m Last Friday in the month 10 30—12 0 noon, 2 0—4 0 p m and 5 0—6 30 p m

Basingstoke Family Planning Clinic, Brambleys Grange, Basing stoke Hants 1st and 3rd Fridays in the month 2 0—4 0 p m (Closed August)

Birkenhead and District Mothers Welfare Clinic, 11a Oxton Road Birkenhead, Cheshire (Near Charing Cross) Tuesdays and Thursdays 2 0—3 0 p m

Birmingham Women s Welfare Centre, 22 Masshouse Lane, Nr Moor Street, Birmingham, 5 Mondays, Tuesdays, Wed nesdays and Thursdays 2 0—4 0 p m , 1st and 3rd Saturdays in the month 2 0—4 0 p m Closed Bank Holiday weeks

Blyth & District Women s Advisory Clinic, Beaulah House, Blyth, Northumberland 3rd Wednesday in the month 2 0—4 0 p m (Closed for Summer Holidays)

Bognor Regis F P Clinic Health Centre Westloats Lane, Bognor Regis Fridays 10 30—11 30 a m

Bolton Family Planning Clinic Temporarily at Queen Street Mission, Centre Street Bolton Monday 9 30—10 30 a m (except Bank Holidays and Bolton Holidays)

Bristol Mothers' Welfare Clinic Salford Hall, 14 The Barton St James s Bristol 1 Fridays 10 45 a m —12 45 p m and 2 15—4 15 p m Income limit £5 per week

Cambridge Women s Welfare Association, 22 Parsonage Street (off Newmarket Road) Cambridge Wednesdays 2 30—4 30 p m

Cannock & District Mothers Advisory Clinic, Arthur Street, Chadsmoor, Cannock, Staffs 2nd Thursday in the month 10 a m to 12 noon

Carlisle & District Women s Advisory Clinic, Eildon Lodge, Northumberland Road, Carlisle, Cumberland 2nd and 4th Fridays in month 2 0—3 30 p m (Closed all August and 1st week September)

Chesterfield Family Planning Advice Centre Brimington Road, Chesterfield Derbyshire 2nd and 4th Thursdays of each month 2 0—4 0 p m

Colwyn Bay & District Branch F P A , The Clinic, Nant y Glyn Road, Colwyn Bay, N Wales Mondays 2 30—3 30 p m Closed Bank Holidays

Darlington Mothers' Clinic, Methodist Church, Coniscliffe Road Darlington Durham Tuesdays 2 0—4 0 p m (Closed Bank Holiday Weeks and all August)

Derby Mothers Clinic Maternity and Child Welfare Clinic, Green Street, Derby, Tuesdays 7 30 p m (Closed Bank Holiday Weeks)

Epsom & Ewell Branch F P A , Ante Natal Clinic Epsom County Hospital, Dorking Road, Epsom Fridays 7 0—8 0 p m (Closed last Friday July and first August)

Exeter & District Women s Welfare Association, Out Patient Department West of England Eye Infirmary Magdalen Street, Exeter Devon Fridays 1 30—5 0 p m (Closed last two Fridays Dec and all August) Sub Fertility Fridays (by appointment)

Branch Clinics

Barnstaple North Devon Dispensary Boutport Street, Barn staple 1st Tuesday in the month 1 45—4 30 p m (Closed during August)

Totnes Adult Education Centre, Shinners Bridge, Dartington 3rd Tuesday in alternate months beginning January, 12 30—4 0 p m

Grimsby Branch F P A , M and C W Centre Watkin Street, Grimsby, Lincs 1st and 2nd Mondays in the month 2 30—4 0 p m (Closed Bank Holidays)

Guildford Women s Welfare Centre, Jarvis Nursing Home, Stoughton Road, Guildford, Surrey 1st 2nd and 3rd Wednes days in the month 2 p m

Halifax Women s Welfare Clinic, Royal Infirmary, Clover Hill Road, Halifax Yorks Tuesdays 6 0—7 0 p m and Thursdays 2 30—3 30 p m (Closed Christmas weeks and all August)

Hemel Hempstead Married Women s Clinic, Churchill Heath Park Hemel Hempstead, Herts 1st, 2nd and 4th Tuesdays in the month 2 30—3 30 p m

Hereford Women s Welfare Clinic, 1 Charlton Flats, Eign Street Hereford Wednesdays 2 0—3 30 p m (Closed Boxing Day)

High Wycombe Birth Control Clinic, The Rye, High Wycombe Bucks Tuesdays 2 0—3 30 p m (Advice given on Medical grounds only)

Hoddesdon Family Planning Advice Centre, Rathmore House, 56 High Street, Hoddesdon, Herts Tuesdays at 2 p m

Liverpool Mothers' Welfare Clinic, 9 Gambier Terrace, Liverpool 1 Wednesdays, Thursdays and Fridays 2 0—3 0 p m

Branch Clinics

Liverpool 4 294 Netherfield Road, Thursdays 10 30—11 30 a m

Liverpool 11 Community Council Hall, Townsend Avenue Mondays 2 0—3 0 p m

Liverpool 21 Linacre Methodist Mission, Linacre Road, Litherland Fridays 2 0—3 0 p m

Manchester, Salford and District Mothers Clinic 70 Upper Brook Street, Chorlton on Medlock, Manchester 13 Mondays and Fridays 1 30—2 30 p m , Thursdays 10 30—11 30 a m and 1 30—3 0 p m (Closed Bank Holiday weeks) (Income limit £8 per week)

Monmouthshire Family Planning Clinic, Educational Settlement, Pontypool, Mon 1st and 3rd Friday in the month 2 30—3 30 p m

Neath Married Women s Clinic, Physiotherapy Clinic, Metal Box Co , Ltd , Canal Side, Neath, Glam 1st and 3rd Thursdays in the month 5 30—7 0 p m

Newcastle Women s Welfare Centre, 24 Shieldfield Green, Newcastle on Tyne, Tuesdays and Thursdays 10 0—11 15 a m and 2 0—3 15 p m and 6 0—7 0 p m

Northampton Women s Welfare Clinic, Maternity and Child Welfare Centre, Dychurch Lane, Northampton 1st four Saturdays in the month 2 0—3 30 p m (Closed Easter and Whitsun, also all August and December)

Norwich Mothers Clinic, 4 Ber Street, Norwich, Norfolk Tuesdays, Wednesdays and Fridays 3 0—5 0 p m Wednesdays 7 0—8 0 p m (Closed Christmas and Easter weeks and first two weeks August)

Nottingham Women's Welfare Association, Methodist Church, Shakespeare Street (side entrance Shakespeare Villas), Nottingham Mondays 1 0—4 30 p m (Closed Bank Holidays)

Oxford Family Welfare Association Maternity Dept , Radcliffe Infirmary, Oxford Entrance Walton Street Tuesdays 2 0—4 0 p m (Closed Public Holidays)

Peterborough Married Women's Advisory Clinic, Infant Welfare Centre, Town Hall Peterborough, Northants Fridays 2 30—4 30 p m (Closed National Holidays and two weeks Summer)

Plymouth Mothers' Advice Centre, Beaumont Welfare Centre, Beaumont Park Plymouth Tuesdays 5 30—7 30 p m

Portsmouth Family Planning Centre, Trafalgar Place, Clive Road Fratton, Portsmouth Hants Tuesdays 1 0—3 0 p m (Closed Tuesdays after Bank Holidays)

Preston and District Mothers Clinic, Lancaster Road Congrega

tional School, Old Vicarage, Preston Wednesdays 2 0—3 0 p m (Closed Bank Holiday weeks and Preston holidays)

Reading Women's Advisory Clinic, Maternity & Child Welfare Centre, Star Lane, Reading, Berks Thursdays 2 30—4 30 p m

Rochdale Family Planning Clinic, Baillie Street School Rochdale, Lancs Tuesdays 2 0—3 30 p m (Closed Bank Holidays and Rushbearing Weeks)

*Sheffield Women s Welfare Clinic, Attercliffe Vestry Hall Attercliffe Common, Sheffield 9 Yorks Mondays 6 30—8 0 p m, Tuesdays 2 0—3 30 p m, Thursdays 6 30—8 0 p m, Fridays 2 0—3 0 p m Subfertility 1st Tuesday in month 6 30—7 30 p m (Closed Bank Holidays and all August.)

Shropshire Women s Clinic Health Centre Murivance Shrewsbury (Advice given on medical grounds only) 1st Saturday in the month 2 0—4 0 p m

Slough & District Married Women s Advisory Clinic Social Centre, Farnham Road (entrance Buckingham Avenue) Slough Bucks Wednesdays 2 0—4 0 p m Branch Clinic Burlington Clinic, Burlington Avenue, Slough Bucks Fridays 2 30—4 0 p m (Closed Christmas Week and 1st week August)

Southend Women s Welfare Clinic, St John Ambulance Hall Queen s Road, Southend on Sea, Essex Mondays 3 0—4 30 p m (Closed Bank Holidays)

Staffordshire (North) Mothers Advisory Clinic, 12 Wellesley Street, Hanley, Stoke-on Trent, Staffs Tuesday and Thursdays 10 30 a m—12 noon and 2 0—3 30 p m Closed Bank Holiday weeks

Sunderland Branch F P A, Argyl House Belvedere Road Sunderland Wednesdays 2 0—3 0 p m (Closed Public Holidays)

*Sussex Mothers Clinic, Haywards Heath Maternity and Child Welfare Centre Paddockhall Road Haywards Heath, Sussex 2nd and 4th Wednesday in the month 2 0—4 0 p m Sub Fertility (by appointment) 4th Wednesday in the month

Swindon Family Planning Association Women s Advisory Clinic, Child Welfare Clinic, Eastcott Hill, Swindon, Wilts Wednesdays 6 30—8 30 p m

Teeside Branch F P A, 45 Norton Road, Stockton on Tees Thursdays 2 0—3 30 p m (Closed during August)

Tynemouth and District Women s Advisory Centre, 1 Cleveland Road North Shields Thursdays 1 45—3 30 p m (Closed Thursday before Christmas)

Warrington and District Mothers Advisory Clinic Therwall Lane Methodist Schoolroom, Warrington Lancs Wednesdays 2 30—3 30 p m Eve Sessions published in Local Press (Closed Christmas week 2 weeks Easter and all August)

Watford & District Branch of the Family Planning Association,

Avenue Clinic (behind Central Library), Watford, Herts Thursday and Friday 6 0—7 30 p m (by appointment only)

*Welwyn Married Women's Clinic, Community Centre, Mill Green Road, Welwyn Garden City, Herts Mondays 6 30—8 30 p m , Thursdays 1 30—3 0 p m Sub Fertility (by appointment only), Fridays 9 30—11 30 a m (Closed Christmas Week and 1st week August)

Winchester and District Married Women's Advisory Clinic, County Welfare Centre, Chamberlayne Road, Eastleigh, Hants Fridays 2 0—4 0 p m

Wolverhampton, Staffordshire and District Women's Welfare Centre, 62 Heath Street, Wolverhampton, Staffs 1st Saturday in the month 2 0—4 0 p m

SCOTLAND

*Dundee Mothers Welfare Advisory Clinic, 50 Caldrum Street, Dundee 1st Tuesday in month 3 0—4 0 p m , new patients 3rd Tuesday in month 3 0—4 0 p m , return visits

Edinburgh Mothers Welfare Clinic, 90 East Crosscauseway, off Nicholson Street, Edinburgh 8 Tuesdays and Fridays 2 0—3 0 p m , Wednesdays 6 30—8 0 p m (Closed August)

Glasgow Women s Welfare & Advisory Clinic, 123 Montrose Street, Glasgow C 4 (New patients please write for appointment) Mondays and Thursdays 2 0—5 0 p m (Closed Christmas week, Easter week, two weeks July)

Paisley Mothers Welfare Clinic, Russell Institute, Causeyside Street, Paisley, Renfrewshire Mondays 2 0—3 30 p m (Closed two weeks Christmas, all August and Bank Holidays)

Perth Mothers Welfare Clinic, 80 South Street, Perth, Fridays 10 30—11 30 a m

Stirling F P Clinic, Public Health Dept , County Council Offices, Springbank, Stirling Wednesdays 5 0—6 0 p m

LIST OF PROVINCIAL F P A CLINICS ARRANGED IN COUNTIES

County	*Town*
Berkshire	Reading
Buckinghamshire	High Wycombe
	Slough
Cambridgeshire	Cambridge
Cheshire	Birkenhead
Cumberland	Carlisle
Derbyshire	Chesterfield
	Derby
Devonshire	Barnstaple (see Exeter)
	Dartington (see Exeter)
	Exeter
	Plymouth
Durham	Darlington
	Teesside
Essex	Dagenham (see London & District)
	Southend
Hampshire	Basingstoke
	Eastleigh (see Winchester)
	Portsmouth
Herefordshire	Hereford
Hertfordshire	Hemel Hempstead
	Hoddesdon
	Watford
	Welwyn Garden City
Lancashire	Bolton
	Liverpool (4 centres)
	Manchester
	Rochdale
	Warrington
Lincolnshire	Grimsby
London	Acton (see North Kensington)
	Bow (see Walworth)
	Camberwell (see Walworth)
	Battersea (see North Kensington)
	Edgware (see North Kensington)
	Greenwich
	Hackney
	Hayes (see North Kensington)
	Hornsey
	Hounslow (see North Kensington)
	Islington (see Cecile Booysen)
	Kensington (see North Kensington)

County	*Town*
London	Marylebone (see Islington)
	Southwark (see Walworth)
	Stepney (see Walworth)
	Tulse Hill
Middlesex	Willesden (see N W London)
Monmouthshire	Pontypool
Norfolk	Norwich
Northamptonshire	Northampton
	Peterborough
Northumberland	Ashington
	Blyth
	Newcastle on-Tyne
	North Shields (see Tynemouth)
Nottinghamshire	Nottingham
Oxfordshire	Oxford
Somersetshire	Bristol
Staffordshire	Cannock
	Stoke on Trent (see Staffs, North)
	Wolverhampton
Surrey	Carshalton (see London & District)
	Croydon (see London & District)
	Epsom and Ewell
	Guildford
	Richmond (see London & District)
Sussex	Bognor
	Haywards Heath (Sussex Mothers Clinic)
Warwickshire	Birmingham
Wiltshire	Swindon
Yorkshire	Halifax
	Sheffield

WALES

Denbighshire	Colwyn Bay
Glamorganshire	Neath

SCOTLAND

Angus	Dundee
Lanarkshire	Glasgow
Midlothian	Edinburgh
Renfrewshire	Paisley
Perthshire	Perth

MUNICIPAL CLINICS

The following local authorities provide advice on contraception for those women who need it on medical grounds Application should be made at the nearest Maternity and Child Welfare Centre or to the Medical Officer of Health

LONDON AND DISTRICT

Barking
Ealing
Fulham
Holborn
Leyton
St Pancras
Shoreditch
Tottenham
Walthamstow

PROVINCES

Barrow in Furness
Bath City
Birmingham City
Blackpool
Blyth
Bournemouth
Bradford
Brighton
Bristol City (9 centres)
Bury
Chelmsford
Cheltenham
Crewe
Dartford
Dewsbury
Doncaster
Durham (11 centres)
Essex (12 centres)
Gillingham
Gloucester City
Grimsby
Hastings
Harrow
Hull City
Ilford
Kendal
Kent (28 centres)
Kingston upon Hull
Kingston-on Thames
Leicester City
Lincoln
Luton
Maidenhead
Margate
Mexborough
Nuneaton
Oxford
Poole
Preston
Reading
Reigate
Rotherham (2 centres)
St Helens
Scarborough
Sheffield City
Shoreham by Sea
Sittingbourne and Milton
Southampton (2 centres)
Sunderland
Sussex
Thurrock
Wakefield
Wembley
West Bromwich
West Riding (Yorks) (3 centres)
Worcester City
York City

WALES

Aberavon and Port Talbot
Aberdare
Barry
Caerphilly
Gellygaer
Llanelly
Llantrisant
Maesteg
Merthyr Tydfil
Ogmore and Garw
Penarth
Pontypridd
Rhondda

SCOTLAND

Falkirk
Lanark

APPENDIX THREE

THE F P A LIST OF APPROVED CONTRACEPTIVES[1]

For many years the Family Planning Association has investigated the qualities of proprietary contraceptives and made the findings available to interested inquirers The tests have concerned such matters as the durability, ageing and distensibility of rubber products, and the spermicidal properties and diffusibility of chemical contraceptives Details of the methods employed and the findings may be obtained on application to the F P A

The following products are approved by the F P A but are *not* listed in order of merit There can in fact be no generally accepted standard of merit in a matter in which individual requirements and preferences play so large a part It should be emphasized that choice of a chemical product cannot be based solely on spermicidal efficiency, such qualities as æsthetic acceptability lubricating properties etc , may be of the utmost importance in any particular case Moreover, any of the products may, rarely cause discomfort or allergic reactions, and for this reason have to be replaced by another All that can be said with certainty is that all the approved products have their limitations as well as advantages

At the present time rubber appliances often fall short of the highest quality owing to shortage of good rubber and skilled craftsmen All sheaths and condoms in the approved list are dated either individually or in batches small enough to ensure their reaching the purchaser before the rubber has deteriorated through age The adoption of this rule offers the public some safeguard against being offered old and perished products

RUBBER AND PLASTIC APPLIANCES

(all sheaths and condoms dated)

Occlusive Caps

Vimule Caps	A Lambert & Co , 16 Dalston Lane London E 8
Dutch Dumas type (5 sizes) Cervical	Lamberts (Dalston) Ltd 200 Queensbridge Road London E 8
Dutch Caps (Durex) flat or spiral spring	London Rubber Co Hail Lane, Chingford, London E 4

[1] This list is issued and periodically revised by the Family Planning Association

Cervical Caps (Check pessaries—Durex)	London Rubber Co, Hall Lane, Chingford, London, E 4
Vaginal Diaphragms, latex, spiral spring (Dutch cap type)	Ortho Pharmaceutical Ltd, Lane End, High Wycombe, Bucks
Plastic Caps (Dumas type, 5 sizes)	Portland Plastics Ltd, Abbey House, 6 10 Victoria Street, London, S W 1
Vaginal Diaphragms, latex spiral spring (Dutch cap type) "Prencap' (Dumas type) Cervical Caps "Cercap', cavity rim, Seamless Dome	Prentif Ltd, Long's Court, St Martin s Street
Cervical ("Racial)	Constructive Birth Control Society, 108 Whitfield Street, London, W 1

Condoms and Sheaths

Condoms and Washable Sheaths	A Lambert & Co (address as above)
Condoms and Washable Sheaths	Lamberts (Dalston) Ltd, (address as above)
Condoms (Transyl, Silvine and Lion) Sheaths (Silvine and Lion) Condoms (Ona and Durex) Sheaths (Durex)	London Rubber Co (address as above)
Condoms and Washable Sheaths	Prentif Ltd (address as above)
Condoms (Empire)	Shield seamless Rubber Co, 45 City Road, London, E C 1

PASTES AND JELLIES

SPERMICIDAL PASTES, JELLIES AND SUPPOSITORIES

to be used with caps, or sheaths condoms for maximum safety

All products have been tested for spermicidal power according to the test devised by Dr J R Baker (J Hyg Camb 1937 37 477) The manufacturers (within each class) are in alphabetical order

Cases of intolerance to any of these products are occasionally found, a knowledge of the essential ingredients and reaction enables a practitioner in such cases to choose an alternative

Name of Product	*Manufacturer*	*Reaction*	*Essential Spermicidal Substance*
(A) Pastes Jellies and Suppositories which reach a satisfactory level of spermicidal efficiency and which have been found reliable and harmless during prolonged use at F P.A. Clinics			
Volpar Paste[2,3]	British Drug Houses Ltd	Alkaline	Phenyl Mercuric Acetate
G P Ointment[2]	Gilmont Products Ltd	Acid	Hexyl Resorcinol
Ortho Creme[2,3]	Ortho Pharmaceutical Ltd	Acid	Ricinoleic Acid and Sodium Lauryl Sulphate
Orthogynol Jelly[1,3]	Ortho Pharmaceutical Ltd	Acid	Ricinoleic Acid and Sodium Lauryl Sulphate
SUPPOSITORIES			
Volpar Gels[4]	British Drug Houses Ltd	Alkaline	Phenyl Mercuric Acetate
G P Solubles[4]	Gilmont Products Ltd.	Acid	Hexyl Resorcinol
(B) Pastes Jellies and Suppositories which reach the required level of spermicidal efficiency by laboratory tests			
PASTES AND JELLIES			
Antemin[2]	Coates & Cooper Ltd	Acid	Trioxymethylene Sodium Dioctyl Sulpho Succinate
Duracreme[1]	London Rubber Co	Acid	Hexyl Resorcinol
Rendells Cream[2,3]	W J Rendell Ltd	Alkaline	Hexyl Resorcinol
SUPPOSITORIES			
Gynomin[5]	Coates & Cooper Ltd	Acid	Sodium D chlor Sulphamide Benzoate
Rendells Gels[4]	W J Rendell Ltd	Alkaline	Hexyl Resorcinol
Rendells Foaming Tablets[5]	W J Rendell Ltd	Alkaline	Zinc Phenol Sulphate
(C) Pastes Jellies and Suppositories which do not by laboratory tests reach the required level of spermicidal efficiency but which have proved satisfactory and harmless during prolonged use at F P.A. Clinics			
PASTES AND JELLIES			
Contraceptive Ointment[2]	Clay & Abraham Ltd	Acid	Oxyquinoline Sulphate
Milsan[1,3]	Menosine Ltd	Acid	Oxyquinoline Sulphate
Prentif Spermicidal Compound[1]	Prentif Ltd.	Acid	Hexyl Resorcinol
SUPPOSITORIES			
Prentif Gels[4]	Prentif Ltd.	Acid	Hexyl Resorcinol

NON SPERMICIDAL LUBRICANTS

K Y Jelly	Johnson & Johnson Ltd.
Surgical Lubricant	Eli Lilly & Co Ltd
Durol	London Rubber Co
Prentif Surgical Lubricant	Prentif Ltd.

[1] Products with lubricating base [2] Products in form of paste or cream
[3] Sold with applicator [4] Non-greasy gels
[5] Foaming tablets can be used in tropics and are less sticky than suppositories with a glycerine-gelatin base

APPENDIX FOUR

OVULATION TEMPERATURE RECORDS[1]

How to keep the Temperature Chart

1 Ask your chemist for a half minute clinical thermometer He will tell you how to read it and how to shake it down After use *always* shake it down to below 96°, and always wash it in *cold* water, never in warm Keep the thermometer by your bedside

2 Begin taking your temperature on the first morning of your menstrual period and *go on taking it every morning without* fail *as soon as you wake* and before you get out of bed, or eat, drink or smoke

3 For this purpose it is best to insert the thermometer in the rectum (back passage), but if you find this difficult, the mouth will have to do Whichever method you use keep to it and state which it is on the chart The mouth temperature is not as reliable as the other, but if you must use it always place the thermometer well under the tongue and keep your mouth tightly shut

4 Leave the thermometer in the rectum a full three minutes before reading it, if you take a mouth temperature it is best to leave the thermometer in place for five minutes Do not guess the time *use a watch or clock*

5 As soon as you have taken your temperature make a dot on the chart on the same level as the figure shown on the thermometer For instance, if the temperature is 97 2° make a dot against that figure on the chart, as shown in the specimen chart below Place *the dot for the first morning s temperature on the first* upright line, for the second morning s temperature on the second upright line, and so on every day until the beginning of the next period Join the dots by a line as shown in the specimen chart When the next period begins go on to another chart

6 If you forget to take your temperature any morning leave a blank on the chart for that day

7 Any time you have a cold or other illness make a note of the days on the chart

8 On occasions when you have sexual intercourse put a circle round the dot for the next morning s temperature (See specimen chart)

9 If you keep an accurate record you will see that the tem

[1] Copies of this explanatory leaflet for patients with blank charts may be obtained on application to the Family Planning Association

perature varies from day to day, but the greatest change usually occurs about 14 days before the period is due to begin About this time there is usually a sudden fall in the temperature followed by a sudden rise, and the general level of the temperature then re mains higher until the next period begins The total variation may not be more than half to one degree (5 squares equal 1 degree) so it is very important to record your temperatures accurately

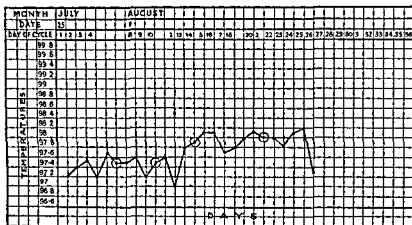


FIG 8 Chart showing ovulation about the thirteenth day of the cycle

10 The most likely time for conception is when the tempera- ture suddenly falls and rises again This time is called ' ovulation day The egg cell is then ready to be fertilized The best dates for having intercourse are the ovulation day itself and the day or two before and after it

11 If you keep your temperature charts carefully for at least three months, your doctor will see if you are having sexual inter course at the right times and will be able to give you helpful advice If your period should be several days late and your tem perature remains on the higher level past the usual number of days, this will be strong evidence that you have become pregnant

APPENDIX FIVE

DESCRIPTION OF SUBFERTILITY CLINIC

THIS appendix outlines the early development of a Family Planning Association clinic at which an attempt has been made to establish a service for the investigation and treatment of cases of infertility, side by side with a contraception clinic This combination is undoubtedly of value since the medical officer sees not only sub fertile patients, but also highly fertile women who wish to limit or space their pregnancies, and these form, therefore, an excellent control group

Premises

The clinic is supported by voluntary contributions and also receives grants from a County and a City Health Authority It is housed in an Out Patients Department and has the use of a large waiting room, two examining rooms, interviewing room and storage space There is good lighting and heating, and hot running water The laboratory investigations (with the exception of the examination of fresh wet films from the vagina and cervix which is done in the clinic) are carried out in an adjoining University laboratory or in the Department of Pathology at the local general hospital To this hospital are referred patients needing uterosalpingography, pelvic diathermy or any surgical intervention There are two branch clinics in other parts of the county with rather similar but less extensive accommodation

Staff

There are nine or ten secretarial workers (mostly voluntary), three nurses, one biologist, one chief medical officer and two assistants

Equipment and Supplies

A good head lamp or other form of illumination
Bivalve speculum with long blades
Small volsellum with fine teeth
Long dissecting forceps
Wool holding cervical probes
Small sized Hegar dilators
Uterine sound
Suction cannula for collecting cervical mucus
Sharman's biopsy curette
Gordon King's or Sharman's insufflation apparatus

2 c c syringe with bayonet fitting intra uterine cannula for in semination, or a plastic graduated cannula made by Vann Bros
10 c c or 20 c c syringe with bayonet fitting intra uterine cannula with an acorn (adjustable if possible) for introducing opaque oil
Electric cautery and battery or transformer
Microscope, lamp, slides and coverslips
Fixatives for endometrial biopsies and cervical mucus slides
Bakelite spoons for collecting vaginal fluid
Platinum loop for making smears for bacteriological examination

Supplies of endocrine preparations, vitamins and certain preparations for local application are kept at the clinic The following firms have been extremely generous in allowing special discount and free supplies Organon Boots, Glaxo Laboratories, Vitamins Ltd., Roche and Parke Davis & Co

Record keeping

At the first visit a full history is taken on a case card designed by members of the medical sub-committee of the Family Planning Association On this card are entered details relating to age parents siblings, occupation religion and income both of husband and wife date(s) of marriage(s) details about pregnancies, use of contraceptives, frequency of intercourse adequacy of coital technique medical history general and pelvic examination, and records of subsequent visits and progress of the case All records are made at the time of examinations or tests

In addition, the wife is asked to keep a personal record of menstrual dates, dates when coitus occurred, and if sufficiently co operative and intelligent a chart of rectal temperatures taken on waking each morning

Examination

After the history has been taken the patient is examined clinically Although the causes of a sterile mating have to be sought in both partners it is usually possible at a clinic of this sort to deal only with the wife in person An estimate of the husband s fertility and health has to be arrived at in various indirect ways by examining samples of semen, by repeated post-coital tests on the wife by questioning her, by getting information from his doctor or by referring him to his doctor or to a consultant for examination Clearly this is an imperfect procedure and ideally there should be sessions at which husbands could attend

In the general examination of the wife special note is made of the body build weight height fat and hair distribution, breast development, complexion, pulse rate, blood pressure, septic foci and operation scars In the pelvic examination the following points

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Staff

There are nine or ten secretarial workers (mostly voluntary), three nurses, one biologist one chief medical officer and two assistants

Equipment and Supplies

A good head lamp or other form of illumination
Bivalve speculum with long blades
Small volsellum with fine teeth
Long dissecting forceps
Wool holding cervical probes
Small sized Hegar dilators
Uterine sound
Suction cannula for collecting cervical mucus
Sharman's biopsy curette
Gordon King's or Sharman's insufflation apparatus

APPENDIX SIX

LABORATORY METHODS USED AT THE EXETER F P A SUBFERTILITY CLINIC

ALTHOUGH this book aims at describing procedures within the scope of the general practitioner the demand for expert seminology and the skilled study of post coital mucus is so great that this appendix is added in spite of the fact that the methods described are possibly of interest more to the laboratory technician than to the average practitioner Many general practitioners, however, do undertake their own examinations of post coital mucus and thereby increase their own interest in the investigation of fertility

As regards seminology, most laboratories differ widely in almost every point of technique and this absence of standardization is responsible for much that is confused and unsatisfactory The methods described below are mainly those used by Dr H A Davidson of the F P A Laboratory, 64 Sloane Street, London, S W 1, and by Mrs C Harvey Biologist to the F P A Clinic, Exeter Slight differences of reporting and technique have developed, even in these laboratories but the fundamental principles are the same Practical details of technique are included because it is just these matters which are the most difficult to find described elsewhere

I Seminal Analysis

Collection of Specimen

Containers ——Corked specimen tubes (3 in × 1½ in) of thin glass are used, when new these should be washed in hot water and soda, rinsed in clean hot water and dried The corks must be a good fit and should be soaked in melted paraffin wax at a temperature hot enough to expel any air from the pores The tubes are rolled in cotton wool and placed in suitable boxes

Production of Specimen ——This should be collected directly into the tube either after withdrawal or by masturbation A sheath should not be used as all sheaths at present available even when washed and specially treated reduce the activity of sperms and most untreated sheaths immobilize all sperms in a few minutes The glass tube should be warmed to blood heat by holding it in the axilla for a few minutes, since contact with cold glass seriously impairs the activity and reduces the viability of sperms Immediately after production of the specimen the tube should

are particularly noted the character of the vulva, introitus and vaginal walls, the position, feel and appearance of the cervix, the position, size, shape and consistence of the uterus and appendages, the presence of discharge and its character

At this stage, provided that no obvious defect has been found, and provided that a post coital test is satisfactory, a proportion of subfertile patients can be given some simple advice and/or treatment and told to try again—reporting results in a few months This applies particularly to those who have not been trying for a pregnancy for more than a year, to those who have apparently been missing fertile days, and to those with faulty coital technique, minor degrees of vaginismus, etc A fair proportion return pregnant, the more resistant cases require detailed and special examinations and often prolonged treatment

Special Examinations

The following special examinations are carried out at the centre or at the hospitals and pathological laboratories with which it collaborates

1 Seminal analysis This includes, in particular, examination of sperm density, basic motility and viability and morphology
2 Testicular biopsy
3 Examination of vaginal fluid
4 Examination of cervical mucus
5 Tubal insufflation
6 Uterosalpingography
7 Endometrial biopsy
8 Miscellaneous laboratory examinations

The following more general examinations are carried out where necessary at the Department of Pathology at the local hospital Wasserman and Kahn tests gonococcal fixation tests, blood counts, sugar tolerance tests, estimations of the basal metabolic rate, testing for Rhesus factors and Ascheim Zondek pregnancy tests It has not been found possible to arrange for hormone estimations or for the estimations of urinary pregnandiol

Final Assessment

Having collected the evidence it is necessary to sort it out and to determine where the causes of the sterility lie Sterile matings are most often caused by multiple factors, some being present in both husband and wife Hence it is necessary to reiterate the importance of examining both partners with thoroughness, and of co ordinating the results of these examinations and planning treatment for them as a unit Moreover, treatment needs to be controlled and modified by further observations This co ordination is one of the most important of the medical officer s functions and calls particularly for sound and experienced judgement

For cases in which the prognosis appears hopeless, adoption is suggested and, if accepted, assistance is given in its arrangement

also glass slides and coverslips, two Thoma hæmocytometers and a microscope with a warm stage For the total count and estimation of motility a 1/6 objective × 10 eye piece with normal tube length is used, giving a magnification of 400

Diluting Fluid—The following diluent is used

Sodium hydrogen phosphate ($Na_2HPO_4 12H_2O$)	2 04 grams
Potassium dihydrogen phosphate (KH_2PO_4)	0 08 gram
Glucose	3 2 grams
Distilled water	100 c c

Ringer s solution and Baker s fluid are equally satisfactory but more trouble to prepare Normal saline is not satisfactory The fluid need not be sterilized, the phosphate buffer can safely be made up in quantities to last a month or two, 3 2 g glucose being added to 100 c c of the phosphate solution as required After the glucose is added the solution will not keep for more than a week or ten days even in cool weather

Mixing——Whenever a sample of semen or of diluted semen, is examined the fluid must be thoroughly mixed by bubbling air through it with a pipette Immobile sperms settle on the bottom of the tube and merely shaking the tube or stirring with a platinum loop is insufficient to give a uniform mixture

Warmth——All glassware and diluting fluid used for living sperms must be at or just above the temperature of the semen According to work done on animal sperms sudden cooling causes loss of activity which may take two or three hours to show its full effect sudden warming to blood heat has no deleterious effect

Technique——As soon as the specimen is received a drop of seminal fluid is placed on a slide warmed for 5 minutes in an incubator at 37° C and examined on a warm microscope stage As suggested by Baker (1937) the motility is scored roughly as 3 (good) 2 (fair), 1 (poor) or 0 (no motile sperm found after careful search) The approximate density having been assessed by eye a dilution of 1 in 20 or 1 in 10 is made with warm diluting fluid using 0 5 c c of well mixed semen A 1 in 20 dilution is suitable if the density has been estimated as 60 million sperms per c c or more, for densities lying between 60 and 20 million per c c a 1 in 10 dilution is used for densities between 20 and 5 million a 1 in 5 dilution is used though the survival of sperms in this greater concentration is not so good as in the more dilute suspensions Very thin specimens should only be diluted 1 in 1 or not at all

The diluted semen is placed in the damp chamber for one hour to allow conditions to equalize after mixing and to ensure that the sperms should reach maximum motility which they may not do if the period of warming is less than one hour Counts are done on Thoma counting slides which together with the measuring

be corked, wrapped in cotton wool and replaced in its box, the wool prevents too rapid cooling

Age of Specimen ——The semen should reach the examiner as soon as possible after it has been produced and certainly within three hours of ejaculation It has been found that reliable con clusions as to initial activity and viability can be drawn from specimens up to three hours old, some information can be obtained from semen which is older than this but it cannot be regarded as so useful or so accurate

Time since last Ejaculation ——It is important that the examiner should be informed of this interval The most satisfactory interval is probably that natural to the couple concerned, in some cases satisfactory specimens are produced with only 12 to 24 hours between ejaculations but in most cases 2 to 3 days seems the optimal period Very short and very long intervals may give equally misleading and unrepresentative results

Examination of Specimen

Volume ——This is recorded in each case Except in cases in which the volume produced is repeatedly low (less than 1 c c) no close correlation has been found between volume and fertility

*p*H ——Accurate values cannot be obtained by simple colori metric methods because of the protein content of seminal fluid, and as there is little evidence that *p*H bears any relation to fertility the use of elaborate electrometric methods is hardly worth while Such methods give *p*H values of 7 4 to 8 4 for semen which has been allowed to cool exposed to air

Viscosity and Rate of Liquefaction ——No simple completely accurate method of estimating and comparing the viscosities of small quantities of seminal fluid has been found A rough measure is made by taking the time required for 1 c c to run out of the standard pipettes used for measuring semen, the fluid being drawn up to the 1 5 c c mark and timed until the meniscus has fallen to the 0 5 c c mark This takes 2 to 2¼ seconds for water and for completely liquified thin seminal fluid Measurements can be repeated at suitable intervals after ejaculation

Count, Motility and Viability

These are described under one section since the estimation of each is part of one procedure

Apparatus ——A warm chamber running at 37° C is required and should contain a museum jar 4½ in × 6 in × 6 in approxi mately to serve as a damp chamber The jar contains about 1 inch of water to which 1 c c of saturated mercuric chloride is added to prevent the growth of moulds A wooden rack on legs holds the experimental tubes and the jar is covered by a glass lid Semen is handled in pipettes measuring 4½ in and drawn out to a diameter of not less than 1 mm at the fine end A number of similar pipettes accurately graduated from the tip are required,

Freshly ejaculated semen cannot be thoroughly mixed or accurately diluted until liquefaction has proceeded for a quarter to half an hour, nor can the activity of the sperms be properly assessed until liquefaction is well advanced This has usually taken place by the time the specimen is delivered at the laboratory, by which time cooling will also have occurred When specimens which have been allowed to cool for half an hour or longer are mixed with warm diluting fluid (see p 237) maximum sperm motility is not reached at once, the percentage of motile forms rising gradually up to one hour and occasionally for even longer We have therefore selected the motility determined after one hour s incubation at 37° C in diluting fluid as the standard for comparison and this is referred to as the *Basic Motility* The Basic Motility figures which according to a number of observations on semen from men of proved fertility may be accepted as satisfactory for specimens of different ages, are set out in Table 4 [1]

TABLE 4 (see page 244)

MINIMUM A VALUES

Density	40–50 million per c c							
Morphology	60–65 per cent normal							
	Age in hours at start of incubation							
	½	1	2	3	4	5	6	7
Basic Motility (per cent fully active after 1 hour at 37 C)	50	45	35	27	21	17	13	10
	Age in hours at start of incubation							
	½		½–3		3–5		5–7	
Viability ratio	1 5		1 25		1 0		0 75	

The viability of a specimen as judged by estimating the percentage of motile sperms after 3 hours incubation and again after 5 hours incubation at 37° C can be conveniently stated in the form of a ratio i e the sum of the ratios of these percentages to the percentage motility found after the first hour s incubation This is referred to as the *Viability Ratio* If no fall in activity occurred during the whole 5 hours incubation the sum of the ratios would be 2 In fact there is usually a gradual falling off in activity, even in specimens from fertile men For example the following falls in activity may be expected and can be accepted as satisfactory (Greater and more sudden falls in activity will occur in specimens from subfertile men)

[1] *Motility* A convenient figure may be obtained by dividing the basic motility of any given specimen by the minimum value for an A specimen of the same age (see Table 4) This makes it possible to compare motilities in specimens of different ages where the differences are not great enough to put them in different groups of the A and B system For example a specimen received 2 hours after ejaculation with a basic motility of 30 / and one received at 3 hours old with a basic motility of 15 / would both score B for motility In the former case the fraction is 30/35 = 0 86 while in the latter it is 15/27 = 0 55 These values are particularly useful when the effects of treatment are being studied

pipettes used for sampling, have been kept in a 37° C incubator At the end of the first hour the warmed diluted semen is again well mixed and a drop placed on each of two Thoma slides One drop is covered immediately with a coverslip and the slide is placed on the warm microscope stage, the other is placed under an inverted glass capsule lined with filter paper moistened with 2 per cent osmic acid, the osmic vapour permanently immobilizes all the sperms in a few seconds, the capsule is then removed and the coverslip put in place When the warmed slide has been allowed to stand for 5 minutes a count is made of all *immotile* sperms and of sperms moving feebly but not progressing (fully active sperms are ignored) A total of 200 to 300 sperms should be counted and the numbers so obtained may be called *a* (immotile) and *b* (feebly motile) A count is then made on the osmicated slide of all sperms in the same number of squares as were used for the count on the unosmicated slide, this gives a number *c* The difference $c - (a + b)$ gives the number of fully motile sperms corresponding to the total number of sperms *c* From these results the number of sperms in 1 c c of undiluted semen (*Density*), and the percentage of fully motile and feebly motile sperms can also be calculated (*Motility*) A similar estimation is made after 3 hours' and again after 5 hours' incubation, and a comparison of the percentage motility present at these three estimations supplies information about *Viability* It is necessary to count an osmicated slide each time as the total count may be reduced owing to disintegration of dead sperms or to their aggregation into large clumps but in calculating percentage motility the earliest total count must be used

Comments—The method of counting described above has been adopted because direct estimation of the number of motile sperm has been found difficult and unreliable for the following reasons (i) When a high percentage of sperms are progressively motile it is impossible to count all the fully motile sperms present at one instant in the field In even a few seconds the motile sperms passing through a small field represent the content of a larger volume of fluid than the non motile sperms found in that field which of course remain unchanged (ii) Very rapid counting is impracticable because the active sperms agitate the non motile ones and only careful observation can distinguish between those oscillating and those merely shaken by others (iii) Frequently the active sperms tend to be found in a focal plane above the inactive sperms and observations confined to the upper field would lead to too high a value for motility It is better to make a direct count of motile sperms if, at the dilution used, the number of progressively motile sperms in sixteen small squares can all be seen and counted at once—a number which in our experience does not exceed four The use of diluting fluid facilitates the estimation of percentage survival by prolonging the life of many of the sperms

Making Smears.—Mix the semen thoroughly by bubbling air through with a pipette and place a drop at one end of a perfectly clean slide, spread the drop evenly and thinly with the side of the pipette, any excess of semen being shaken off. Dense specimens may be diluted with an equal quantity of Ringer's solution or other isotonic diluent.

Fixation.—Immediately after spreading the smear and before it has dried, invert the slide over a watch glass containing a drop of 2 per cent osmic acid (fixation is effected by the vapour) for 5 minutes. Place the slide on a flat surface and flood with Schaudinn's fluid (2 parts saturated aqueous mercuric chloride to 1 part absolute alcohol) and leave for 5 minutes. Shake off the Schaudinn's fluid and rinse the slide in absolute alcohol saturated with iodine, then rinse in 96 per cent and 70 per cent alcohol and wash for 10 minutes in running water.

Staining.—After washing, place the slide in Delafield's hæmatoxylin for 20 minutes, and rinse in water. Weigert's hæmatoxylin (10 minutes) gives rather better preparations but slides must be washed in running water for 1 hour after fixing and differentiation requires greater care. Rinse in 70 per cent acid alcohol until the film, except the larger ridges, is almost colourless (a few seconds only) and examine under a microscope with low power. Sperm tails should stand out clearly, heads should appear transparent not black, and the background should be colourless or faintly mauve. If differentiation is not satisfactory return to acid alcohol for a short time. Wash in running water for 15 minutes (in soft water districts rinse in artificial tap water to blue the hæmatoxylin). Counterstain in ½ per cent aqueous Rose Bengal for 1 minute only, rinse in water, take up rapidly through 70 per cent, 96 per cent, and absolute alcohol to xylol, mount in Canada balsam. A square coverslip covers sufficient film and the palest, not the densest, part of the film should be selected.

Examination.—It will be found that in some cases coagulation of the seminal fluid by Schaudinn's fluid causes radiating creases to appear on the smear which stain deeply, however sufficient sperms can be observed in the less dense areas. A thin region is selected under low power and then examined with a 1/12 oil immersion objective. For maximum accuracy 400 to 600 sperms should be examined but as a routine practice 200 are counted as this gives values lying within 3 per cent of the values obtained with larger counts.

When examining a stained film for morphology, each sperm is considered and if the whole sperm appears normal it is scored as such, if the head is abnormal in any way it is scored as an abnormal head type regardless of whether the middle piece and tail are normal or abnormal, if the head has a normal appearance and the middle piece and tail are abnormal it is scored under the appropriate heading. Thus each sperm occurs in one category only and the total of each type can be calculated as percentages

For a specimen received ½ hour after ejaculation and kept at 37° C in suitable diluting fluid	A fall of not more than 20 per cent in motility between 1st and 3rd hour of incubation A fall of not more than 50 per cent *in motility* between 1st and 5th hour of incubation
For a specimen received 3 hours after ejaculation and kept at 37° C in suitable diluting fluid	A fall of not more than 40 per cent in motility between 1st and 3rd hour of incubation A fall of not more than 80 per cent in motility between 1st and 5th hour of incubation

The fall in motility should be so distributed that the Viability Ratio (as defined above) is at least 1 5 in the case of specimens only half an hour old at start of test and at least 1 2 if, for example, the specimen is 3 hours old when received

e g for specimen half an hour old

Percentage motility after 3 hours' incubation	= 40	= 0 8
Percentage motility after 1 hour s incubation	= 50	
Percentage motility after 5 hours incubation	= 35	= 0 7
Percentage motility after 1 hour s incubation	= 50	
		1 5

e g for specimen 3 hours old

Percentage motility after 3 hours' incubation	= 24	= 0 8
Percentage motility after 1 hour s incubation	= 30	
Percentage motility after 5 hours incubation	= 12	= 0 4
Percentage motility after 1 hour s incubation	= 30	
		1 2

Comparative Morphology of Sperms

In our experience all methods of preparing stained films of semen involving drying either with or without heat are liable to produce distortion of the sperm head and even more of the middle piece Moreover the sperms become aggregated into clumps which makes critical examination difficult, and during the process of clearing such slides with Chloramine T the larger and heavier types of abnormal sperms tend to wash off more easily than do the other types, thus giving a misleading differential count The following method has been adopted after experimentation with a number of fixatives and stain combinations It gives a clear definition of head middle piece, tail and end piece, and comparison of stained films with fresh material shows no significant change of form resulting from the technique

Making Smears.—Mix the semen thoroughly by bubbling air through with a pipette and place a drop at one end of a perfectly clean slide, spread the drop evenly and thinly with the side of the pipette, any excess of semen being shaken off. Dense specimens may be diluted with an equal quantity of Ringer's solution or other isotonic diluent.

Fixation.—Immediately after spreading the smear and before it has dried, invert the slide over a watch glass containing a drop of 2 per cent osmic acid (fixation is effected by the vapour) for 5 minutes. Place the slide on a flat surface and flood with Schaudinn's fluid (2 parts saturated aqueous mercuric chloride to 1 part absolute alcohol) and leave for 5 minutes. Shake off the Schaudinn's fluid and rinse the slide in absolute alcohol saturated with iodine, then rinse in 96 per cent and 70 per cent alcohol and wash for 10 minutes in running water.

Staining.—After washing, place the slide in Delafield's hæmatoxylin for 20 minutes, and rinse in water. Weigert's hæmatoxylin (10 minutes) gives rather better preparations but slides must be washed in running water for 1 hour after fixing and differentiation requires greater care. Rinse in 70 per cent acid alcohol until the film, except the larger ridges, is almost colourless (a few seconds only) and examine under a microscope with low power. Sperm tails should stand out clearly, heads should appear transparent not black, and the background should be colourless or faintly mauve. If differentiation is not satisfactory return to acid alcohol for a short time. Wash in running water for 15 minutes (in soft water districts rinse in artificial tap water to blue the hæmatoxylin). Counterstain in ½ per cent aqueous Rose Bengal for 1 minute only, rinse in water, take up rapidly through 70 per cent, 96 per cent, and absolute alcohol to xylol, mount in Canada balsam. A square coverslip covers sufficient film and the palest, not the densest, part of the film should be selected.

Examination.—It will be found that in some cases coagulation of the seminal fluid by Schaudinn's fluid causes radiating creases to appear on the smear which stain deeply, however sufficient sperms can be observed in the less dense areas. A thin region is selected under low power and then examined with a 1/12 oil immersion objective. For maximum accuracy 400 to 600 sperms should be examined but as a routine practice 200 are counted as this gives values lying within 3 per cent of the values obtained with larger counts.

When examining a stained film for morphology, each sperm is considered and if the whole sperm appears normal it is scored as such; if the head is abnormal in any way it is scored as an abnormal head type regardless of whether the middle piece and tail are normal or abnormal; if the head has a normal appearance and the middle piece and tail are abnormal it is scored under the appropriate heading. Thus each sperm occurs in one category only and the total of each type can be calculated as percentages.

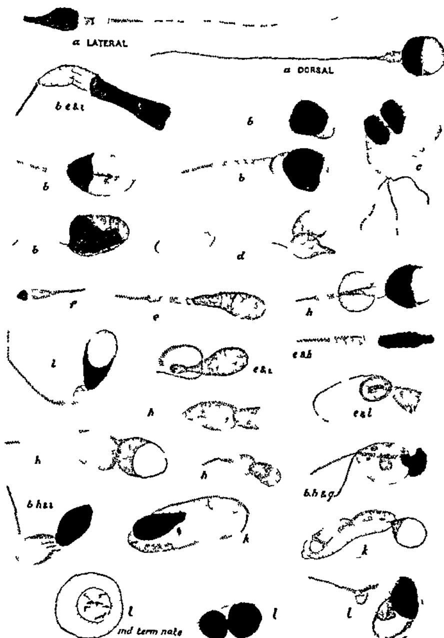


FIG 29 Semi diagrammatic drawings made from slides fixed and stained as described in the text to illustrate some of the types of sperms that may be met in making a differential count The full length of tail is not shown in every case

(a) Normal
(b) Various types of amorphic heads
(c) Multiple
(d) Double head
(e) Pear or tapering
(f) Pin head
(g) Double tail
(h) Collar and thick neck
(i) Bent
(k) Ring forms
(l) Cells of indeterminate origin.

of the total sperm population The abnormal sperms are scored under the following headings *Abnormal heads*, amorphic, pear or tapering, giant, pin, double, multiple *Abnormal middle and tail*, bent, ring, folded, short, multiple collar Examples of some of these types are shown in Fig 29 Detached heads and tails are not included in the 200 sperms on which the percentage of abnormal forms is assessed, but the number observed during this count is recorded

Other Cells—Polymorphonuclear leucocytes occur quite commonly at the rate of half a million per c c in seminal fluid even from fertile men On the routine slide the number of such cells associated with 100 sperms is counted and from a knowledge of the sperm density the concentration of polymorphs per c c can be calculated Cellular elements other than sperms and polymorphs are not infrequently present particularly in specimens from sub fertile men, but with the exception of cells of the squamous type it is seldom possible to identify them or state their origin with any certainty Such cells are counted while the differential sperm count is being made and are scored as cells of indeterminate origin

Fructose—Fructose estimations are now carried out by the method described by Dr T Mann (Mann 1948) It is too early to say whether this estimation is of much clinical value It is quite apparent that, owing to the relatively low sperm densities encountered in human semen, it is impossible to assess sperm motility by measuring the rate of fructolosis as can be done, for example in the case of the ram and the bull Nor as yet has any direct relationship between androgen levels and fructose content of semen been established in man though Miss U Parsons, working at the Molteno Institute, Cambridge has demonstrated a very close relationship between androgens and the formation of seminal fructose in rabbits The estimation may be of value in helping to establish a diagnosis in cases of azoospermia Since seminal fructose is produced mainly in the seminal vesicles its presence in the seminal fluid suggests that a complete absence of spermatozoa is due either to failure of the germinal epithelium or to bilateral non patency of ducts somewhere between the testes and the seminal vesicles, whereas total or almost complete absence of fructose in association with a small volume, suggests an obstructive lesion between seminal vesicles and the exterior, e g in the ejaculatory ducts

Conclusion

Whenever possible more than one specimen should be examined although a man tends to show a characteristic seminal picture considerable variation can undoubtedly occur in the same individual Therefore when judging a specimen it is essential not only to know the interval since the previous ejaculation and the age of the specimen but also whether there is any relevant point

in the history that may be responsible for departure from the norm (e g recent illness, injury, exhaustion, change of occupation)

In an attempt to establish a means of assessing male fertility we have taken what in our view are the four most important factors in a seminal analysis—sperm density, basic motility, viability and morphology—and have allotted to each a somewhat arbitrary minimal value for what may be regarded as satisfactory These minimal values (shown in Table 4), or anything above, are scored as "A" values, anything below is scored as "B From a consideration of results it appears that a man's fertilizing capacity is not seriously impaired until he fails to score an "A" for any of the four factors, while it is relatively impaired if he scores only one or two "A s Clearly the less fertile the wife the more important does the husband s relative infertility become

Examples of Report Sheets are shown on pages 246–7

Serial No M
Previous Report No —
Charge made —

REPORT ON SEMEN *

Name and Address .. .. .. Date

Doctor's Name and Address .. .. ..

Time produced Method of obtaining specimen.

Time examined Last coitus days ago

Volume (1) No of sperm per c c (2) million

Structure abnormality (counted) Total %

Abnormal heads (3) % Abnormal middle & tail (4) % Immature forms (5) %

Debris cells Viscosity

Age in H	H at 37	% F A	% S Activ

For the guidance of practitioners we print below variations of figures from seminal specimens where the husband is known to have produced a pregnancy

(1) 1 5—8 c c (2) 5 —550 million (3) 5—75% (4) 10—30% (5) 0—8%

Remarks

Volume Density Consistence

Basic Motility Viability

Morphology .. ..

This is a normally fertile / border line / subfertile specimen

Fig 30

* Report Sheet used at the F P A Laboratory 64 Sloane Street London S W 1

REPORT ON SEMEN *

Date ______ Name and Address ______

Produced ______ Received ______ Age ______ hrs. Date of last Co us ______

V lum ______ ccs. Viscosity ______ pH ______ Density ______ m/cc.

Total Cou t ______ m.

MORPHOLOGY (Sperm Examined Total Normal Sperm ______

All p w h Abnormal H ad ______ % Sp with normal head but bnormal middl or tail ______ %

ANALYSIS OF ABNORMALITIES (one perm may show several different bnormalities)

HEADS.

Amorphic ______ Double ______

P ar or T pering ______ M ltiple ______

Gia t ______ ______

Pin ______ ______

______

MIDDLE AND TAIL.

Bent ______ Collar ______

Ring ______ Multiple Tail ______

F lded Tail ______

Short Tail ______

______

Detached Heads ______ } per 100

Tails ______ } complete sp.

Debris ______

Mul ple elements pe 100 sp. ______

ACCESSORY CELLS (millions/cc)

Indetermin te (possibly Testicular) ______ Squamous ______ Polymorphs ______

Eosinoph l Anucleate Bodies ______

MOTILITY AND VIABILITY

Hrs. Prec	Age at Hours	% Progressive	% Sluggish	n/cc Progressing	n/cc Sluggish

Activity ______

N mber ______

Morphology ______

Viability ______

REMARKS

Fig 31

II Examination of Vaginal Fluid

For the method of extraction and examination of wet films see page 46 After the spoon has reached the laboratory two films are fixed and stained as follows

a For Bacteria ——Films are dried, fixed by heat and stained by Gram s method No attempt is made to identify the organisms precisely during the examination of the wet film they are grouped merely as Doderlein bacilli , diphtheroids small bacilli and cocci (Gram positive or negative), and assessed as ' domi nant many or few

b For Cytology ——Smears are fixed by inversion over 2 per cent osmic acid for 5 minutes After washing they are stained with Delafield s hæmatoxylin for 15 to 20 minutes They are counter

* Report Sheet used at the Exeter F P.A. Clinic.

stained in Rose Bengal (½ per cent aqueous) for 10 minutes One hundred epithelial cells are examined and the percentage of squames with large reticulate nuclei and with pyknotic nuclei is recorded and also the percentage of rounded (basal) cells The degree of cornification of the squames is indicated by the staining reaction, fully cornified cells staining red, uncornified cells blue and intermediate stages mauve However, small variations in staining time or the presence of seminal fluid or cervical mucus tend to modify the response of squames to stains and any estimation of cornification by means of staining reaction is therefore somewhat unreliable Sperms, pus cells and red blood corpuscles associated with 100 squames are counted if not very numerous they are scored as "+ + if there are large numbers in every field

c *p*H ——What remains of the fluid is used for making a direct estimation of the *p*H by means of a quinhydrone electrode, adapted so that quantities as small as 0 05 c c can be used and the determination can be made without transferring the fluid from the bakelite spoon in which it is collected

III Examination of Cervical Mucus

For the method of extraction and examination of wet films see p 46 If enough mucus has been collected direct estimation of *p*H by means of a quinhydrone electrode can be carried out as for vaginal fluid The rest is spread over a slide as thinly as possible and fixed for staining by exposing it to 2 per cent osmic acid vapour for 5 to 10 minutes The smear is stained in Delafield s hæmatoxylin and counterstained with Rose Bengal

One hundred fields spread over four areas of the smear are examined It is impossible to make an even smear of most cervical mucus, and fields containing insufficient mucus to stain purple and fields too dense for proper assessment of cells are ignored The total number of sperms found in 100 fields is recorded together with the number of these sperms showing abnormalities or lacking a tail Other cells (vaginal squames, pus cells and red blood corpuscles) are not counted but the number of fields in which they occur and also the number of fields containing stained mucus but no cells, or only spermatozoa are recorded The occurrence of ' mucus cells i e cells apparently originating from the cervical cubical epithelium or from the endometrium and occurring in the smear in various stages of degeneration is also noted The approximate number of each type of cell per 100 fields can be calculated from these data using the following formula $x = \log_e q$, where x = density per field, q = per cent of fields from which the particular type of cell is *absent* e = base of natural logarithm

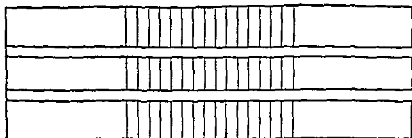
IV Invasion Test

In order to estimate the distance to which and the rate at which sperms will invade a given sample of mucus Mrs Clare

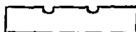
Harvey has devised a specially constructed and marked slide which can now be obtained from Messrs W Watson & Sons, 313 High Holborn, London, W C 1 (see Fig 32)

The slide is divided lengthwise by two deep grooves, and 3 cm of the central region is divided by transverse lines etched at 2 mm intervals The grooves prevent the seepage of semen round the edge of the mucus and maintain a standard width of surface between mucus and semen *No coverslip* is used and therefore all capillary forces are avoided except those at the fluid interface and between the slide and the fluids The surface tension forces set up in elastic mucus between a coverslip and slide or in a capillary tube, must be enormous compared with the motive power of a progressing sperm

CERVICAL MUCUS SLIDE



SURFACE VIEW



END VIEW

Fig 32 Slide for measuring degree and rate of invasion of cervical mucus by spermatozoa

Method——The mucus is spread over as much of the etched area as it will cover in the central region between the grooves It should be sufficient not to draw away from the edge of the groove and thin enough for the etched lines to show as faint shadows when the 2/3 objective is focused on the surface of the mucus Approximately 0 05 c c of semen is placed near one end of the mucus and the drop is stroked gently with a platinum loop until the mucus is in contact with the semen for the whole width between the grooves Some seepage of semen over the surface of the mucus takes place but ceases a few seconds after contact The slide is incubated at 37° C in a petri dish floored with wet blotting paper and sealed with vaseline It is examined with the 2/3 objective after ½ 1 and 3 hours (The intervals at which ex-

aminations are made can of course be varied to suit individual workers)

Examination ——The slide is moved until the junction of semen and mucus is in focus and the activity of the sperms in the semen drop is noted The slide is then moved until one transverse line has been passed and the presence or absence of sperms and their motility beyond this line is scored The slide is then moved again until a second line is crossed and so on, if no sperms are found in five fields in two consecutive areas the search is abandoned and the slide returned to the incubator At the third examination (i e when the semen has been in contact with the mucus for 3 hours) a note is made of the furthest distance from the interface at which a sperm has been seen under the 2/3 objective In order to be certain that sperms beyond this point are not being missed the mucus is separated by holding a square coverslip vertically with its edge on the etched line beyond which no sperms have been seen, with the edge of a second coverslip the mucus distal to this line is drawn away and placed on an ordinary microscope slide, covered and examined carefully for sperms under a 1/6 objective In practice it is quite rare to find sperms under the 1/6 which have been missed with the 2/3 objective

V Fixation and Staining of Endometrial and Testicular Material for Biopsy

The best routine fixative for endometrial curettings and fragments from the testicle is Bouin s fluid Pieces should be rinsed first in physiological saline and then transferred to the fixing fluid In this they may be left for an indefinite period but fixation overnight is the normal procedure After this transfer to 70 per cent alcohol for 3 to 4 hours, 90 per cent alcohol for 2 hours, absolute alcohol for 2 hours, and to benzole till cleared The time allowed in each alcohol during fixation will depend on the size of the curetting and should be increased if pieces are very large, especially if removed during a dilatation and curettage Embed in wax and cut sections at 8

It is regarded as important to mount a series of sections on each slide, varying in number from 20 to 60 according to the size (rather than the 1 or 2 sections usually provided)

Take sections down to distilled water and stain in Delafield s hæmatoxylin for 10 to 12 minutes Rinse under the tap and then briefly in acid 70 per cent alcohol (15 to 30 seconds) rinse again under the tap and blue in tap water or Scott s artificial tap water Transfer to 1 per cent eosin solution for ½ to 1 minute Rinse under the tap and take rapidly through 70 per cent 90 per cent and absolute alcohol to benzole or xylol Mount in Canada balsam The times in the stains will depend to some extent on the samples of stain used and should be varied according to the worker s experience A second slide stained to show elastic fibres with Weigert s fuchselin is a valuable addition

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INDEX

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